Empowering Women Through the Use of Technology: A Scoping Review

A Thesis Submitted to the College of Graduate and Postdoctoral Studies

In Partial Fulfillment of the Requirements
For the Degree of Master of Nursing
In the Department of College of Nursing
University of Saskatchewan

Submitted By

April Lynn Mackey, BScN, RN

PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a Postgraduate degree from the University of Saskatchewan, I agree that the Libraries of this University may make it freely available for inspection. I further agree that permission for copying of this thesis/dissertation in any manner, in whole or in part, for scholarly purposes may be granted by the professor or professors who supervised my thesis/dissertation work or, in their absence, by the Head of the Department or the Dean of the College in which my thesis work was done. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University of Saskatchewan in any scholarly use which may be made of any material in my thesis.

DISCLAIMER

Reference in this dissertation to any specific businesses, commercial products, process, or service by trade name, trademark, manufacturer, or otherwise, does not constitute or imply its endorsement, recommendation, or favoring by the University of Saskatchewan. The views and opinions of the author expressed herein do not state or reflect those of the University of Saskatchewan and shall not be used for advertising or product endorsement purposes.

Requests for permission to copy or to make other uses of materials in this thesis/dissertation in whole or part should be addressed to:

Dean of the College of Nursing
104 Clinic Place
University of Saskatchewan
Saskatoon, Saskatchewan, S7N 2Z4, Canada

OR

Dean of the College of Graduate and Postdoctoral Studies
University of Saskatchewan
116 Thorvaldson Building, 110 Science Place
Saskatoon, Saskatchewan, S7N 5C9, Canada

ABSTRACT

The achievement of gender equity and equality has been a long-time goal of many international entities. The main indicator for the goal of women's empowerment, as part of the Sustainable Development Goals (SDGs), has been to: "enhanc[e] the use of enabling technology by increasing the proportion of women and girls who have access" (United Nations [UN], p. 20). While information and communication technologies (ICTs) were initially thought to be neutral in terms of access and opportunity, emerging trends now indicate that the use of technology within society has significant social implications, specifically related to gender as a determinant of health.

Using the Arksey and O'Malley (2005) methodology for scoping reviews, the following question was answered: What is the impact of ICT on the level of women's empowerment worldwide? Using the stated research question, the primary objective of this scoping review was to identify the extent, range, and scope of evidence involving the impact and influence of ICTs on women's empowerment. The major themes that emerged from this review included: (a) the means in which ICTs have assisted in building the capacity and tools of women, (b) the manner in which ICTs have been used as an intervention in supporting empowerment; and (c) the approach in which ICTs can act as potential barriers and facilitators to women's attainment of agency. The evidence from this scoping review supports the innovative use of current and emerging technologies within health care to connect with, engage, and empower women both within the acute and community settings. The extant evidence explores how ICT has played a role in the promotion and support of women's empowerment as well as supporting the development of health care policies and relevant programs.

ACKNOWLEDGEMENTS

This journey has been both challenging and immensely rewarding. Without the support of colleagues, family, and friends, my success would not have been possible.

First, I would like to express the utmost gratitude to my supervisor and mentor, Dr. Sandra Bassendowski, for your unwavering encouragement and belief in my abilities. Over the course of this degree, your guidance and expertise in teaching and research has helped to shape who I am as a registered nurse, an educator, and an aspiring researcher. Thank you for giving me space and time when I needed it but for also giving me a gentle nudge when I needed that, too. This journey would not have been possible without you and I am forever grateful for that.

Second, I would like to offer sincere thanks to my advisory committee, Dr. Pammla Petrucka and Dr. Marie Dietrich Leurer. Your knowledge, insights, and encouragement have been invaluable. Thank you for the many impromptu visits and discussions.

My success would not be possible without the support of my family and friends. To my parents, for believing in me always. To my sister, without your many supports over the years I would not be here now. To my bestie, for keeping me focused and helping me to see the light at the end of the tunnel. Last, but certainly not least, to my husband, for giving me all the space, love, and encouragement I needed so I could see this through.

DEDICATION

I am dedicating this thesis to the memory of my beloved Nan and Pop. Thank you for realizing the potential in me. Through you, I found my passion for seeing technology as a means through which to empower others.

I also dedicate this work to all the amazing women in my life. Your bravery, courage, and big hearts continue to inspire me. Thank you for all that you have taught and continue to teach me.

TABLE OF CONTENTS

Tables

Figures

Abbreviations

World Health Organization (WHO)

United Nations (UN)

Millennium Development Goals (MDGs)

Sustainable Development Goals (SDGs)

International Telecommunication Union (ITU)

Information and Communication Technology (ICT)

Public Health Agency of Canada (PHAC)

United States of America (USA)

Center for Disease Control (CDC)

United Nations International Children's Emergency Fund (UNICEF)

The Joanna Briggs Institute (JBI)

Canadian Institute of Health Research (CIHR)

Health care providers (HCPs)

Science, technology, engineering, and math (STEM)

Global positioning system (GPS)

United Nation Educational Scientific Cultural Organization (UNESCO)

Canadian Nursing Students Association (CNSA)

Saskatchewan Registered Nurses' Association (SRNA)

Definitions

Empowerment - The process by which women who have experienced oppression acquire the ability to make autonomous and strategic life choices based on their personal priorities. These choices are made regarding matters of importance, using internal and external resources. When a woman has the resources, agency, and capability to carry out these decisions, empowerment has been achieved (Kabeer, 1999; Mosedale, 2005).

Agency - The ability to define personal goals and act upon them (Kabeer, 1999). This is where self-efficacy and capacity come together to inform autonomous decision making. It requires a transformational change of societal views and practices.

Information and communication technology - A system of devices, networks, and applications that combine to allow for the exchange of data, in all of its forms, between users and devices, across the internet and related networks. For the purpose of this research, the singular form will be ICT and the plural will be referred to as ICTs.

Gender equality - An equal balance of available rights, resources, and opportunities specific to one gender due to being born male or female (Women Like Us Foundation, 2018).

Gender equity - Fairness of resource distribution, in conjunction with respective need, and implies that inequity is brought about by societal conditions and thus avoidable (WHO, 2017).

Health literacy – the ability of an individual to "access, understand, evaluate and communicate information as a way to promote, maintain, and improve health in a variety of settings across the life course" (Rootman & Gordon-El-Bihbety, 2008, p. 11).

Digital literacy - The ability to understand and use information in multiple formats from a wide variety of sources when it is presented, as well as to thinking critically and to adapt skills from one medium of technology to another.

Chapter 1 Introduction

1.1 Thesis Overview

The achievement of gender equity and equality has long been a goal of international entities such as the World Health Organization (WHO), the United Nations (UN), and numerous for profit and non-profit organizations. In 2015, the UN met to discuss the progress of the Millennium Development Goals (MDGs) in order to envision the next steps in global development. The transition from the MDGs into the Sustainable Development Goals (SDGs) in 2015 was accompanied by Target 5 which indicates the imperative to "Achieve gender equality and empower all women and girls" (UN, 2015 p. 20). The main indicator in the document in support of the goal of empowerment is "enhancing the use of enabling technology by increasing the proportion of women and girls who have access" (UN, p. 20). The necessity of this goal is supported by a recent International Telecommunication Union (ITU) survey on broadband internet access, as well as technology ownership, and usage globally (ITU, 2017). Data from this survey indicated that women have less access to technology overall, and, as a result, their usage is less than their male counterparts (ITU).

Information and communication technologies (ICTs) have made communication and networking a possibility between and among people on a global scale. Broadly defined, ICTs encompass any communication device or application including, but not limited to, radio, television, cellular or smartphones, computers, and similar devices (Quan-Haase, 2016; Techtarget, 2016). Since their inception, ICTs have generally been viewed as gender neutral, impacting both men and women equally and without social implications (Brimacombe & Skuse, 2013; Gurumurthy, 2004; Hafkin & Huyer, 2007; Quan-Haase). Beginning in the 1970s, ideas and arguments emerged that technologies were dominated by men and inherently contained

significant gendered inequalities in their structure and utilization (Brimacombe & Skuse; Nielsen, von Hellens, & Beekhuyzen, 2005; Pretorius & de Villiers, 2009; Ramsey & McCorduck, 2005). Subsequently, ICTs have been understood to have significant social implications as the access to, and experience of, technologies are directly related to power relations within communities, nations, and organizations (Dé, 2016; Doong & Ho, 2012; Goodman et al., 2016). Mansell (2010) contended that the evolution of ICT in society has followed the diffusion of innovation pathway. Individuals with the most knowledge, capital, and status in society tend to adopt and utilize technological innovation quicker than those who are less educated and less wealthy (Mansell; Rogers, 2003). When viewed through the lens of the diverse socioeconomic status of society, certain members of communities, nations, and organizations are in a better position to access, utilize, and control ICTs. Though not the only form of ICT that can empower women, ownership of a personal mobile device can have a cascade effect for any individual, but specifically for women who often lack autonomy and independence in their daily lives. Information and communication technologies can provide a plethora of opportunities for women by enhancing their entrepreneurship, economic gain, education, as well as health and safety (Altinay & Altinay, 2018; Alves & Steiner, 2017; Güney-Frahm, 2018).

1.1.1 gender as a social determinant of health.

A key determinant of health across the globe is gender, not to be confused with sex. Though the terms are often used interchangeably, sex refers to the biological and physiological characteristics that distinguish males and females from each other (Public Health Agency of Canada [PHAC], 2012b). Gender, however, is socially and culturally constructed by society and ascribed to females and males in terms of roles within relationships, behaviours, and power

differentials (PHAC). Understanding the nature of gender-based roles in society can contribute to a greater understanding of how cultural and social environments can impact exposure to disease and injury, for both men and women (El-Menyar et al., 2014; Greaves, 2011; Timsina, 2017; World Economic Forum, 2017). In turn, this understanding improves access to, and the development of resources and programs that promote equity among men and women while protecting their health. All domains of nursing, such as direct practice, education, research, administration, and policy, are concerned and influenced by the social determinants of health as well as the equitable distribution and access of health resources among individuals, families, and communities. Nursing practice must be grounded in an awareness and understanding of how gender can influence a woman's experience in health care and society.

Despite a call for gender equality by the UN for 2030, women continue to experience discrimination and violence and are often disadvantaged in terms of access to education, employment, and health services across the globe (Chopra & Muller, 2016; Sen & Mukherjee, 2013; UN, n.d.). Statistics from the UN (2013) indicate that one in five women and girls aged 15-49 report or experience sexual violence in their lifetime. Women, as victims, constitute two thirds of all instances of intimate partner violence worldwide (UN, 2013). Women's disempowerment can be, in part, attributed to the role of gender as a key social determinant of health.

The conditions in which women live, work, and play have a direct impact on their quality of life and health. The circumstances that shape an individual's health, either directly or indirectly, are known as the social determinants of health; these include income, employment, education, gender, food insecurity, housing, social inclusion, social safety network, health services, race, disability, and Aboriginal status (Bryant et al., 2011; Raphael, 2016). Each of

these determinants potentially impact the health of an individual more than diet, physical activity, and other health behaviours (Raphael). The impacts of the social determinants of health on an individual are interrelated and influence all others. For example, someone who has low income is more likely to have less education, less secure housing, and decreased access to health services (Mikkonen & Raphael, 2010; Raphael).

Women across the globe experience more unfavourable social determinants of health than men. Gender as a social determinant of health is influenced by the "gendered" norms of the roles, personality traits, attitudes, relative power, and influence that society ascribes to gender (Mikkonen & Raphael, 2010; PHAC, 2013). Societal norms, attitudes, and power differentials can vary depending on the geographic and cultural nuances of the environment. The standardization of measurements for what constitutes the poverty line, calculation of income, scales that adjust for differences, and metrics for composition of households are inconsistent at best and lacking at worst. As such, ascertaining current and accurate statistics regarding gender as a determinant of health are a challenge in this regard. Women carry the bulk of responsibility for raising children and caring for household obligations, which, globally, are reasons women continue to be at a disadvantage (Lips, 2013; Marmot et al., 2012; Mikkonen & Raphael). Due to a lack of affordable and quality daycare, women are over-represented in the part-time work force, and often remain within the low-income bracket to care for children (Lips; Mikkonen & Raphael; Marmot et al., 2012; Statistics Canada, 2015a). Overall, women in Canada aged 15 and older earned $0.87 less on the dollar than men in their jobs in 2017 (Statistics Canada, 2018a). Globally, women's full earnings are estimated as 82.4% of men's (Lips) and the earning statistics of 189 countries suggest a gender pay gap in favour of men (UN Development Programme, 2018). A recent Status of Women Canada report (2015) indicated that lone female parents,

unattached women aged 45-64, recent female immigrants, off-reserve Aboriginal women, and women with disabilities are all considered to be at-risk groups likely to experience persistent low-income. This finding is echoed across many countries in which women are dependent on their spouses for economic resources (UN Statistics Division, 2015). Furthermore, as women are more likely to engage in unpaid labor, women often cannot readily access household funds (UN Statistics Division). Cultural norms and power differentials reinforce this inequitable division of economic resources which continues to perpetuate the gender gap.

Globally, women and girls are also disproportionately at risk to be victims of domestic and sexual violence (Center for Disease Control [CDC], 2014; Status of Women Canada Report, 2015; United Nations Statistics Division, 2015). Regardless of age, education, or income, one in three women globally have experienced physical or sexual violence (WHO, 2017). Two thirds of the aforementioned women were victimized by an intimate partner or family member (UN Statistics Division). The evidence suggests that the factors affecting and contributing to violence against women are social isolation, race, unstable housing, poverty, gender power relations, and substance abuse (Golden et al., 2013; House of Commons, 2017; UN Statistics Division). Young women with low income, and those who identify as a minority, have an increased likelihood of being the victim of domestic violence and rape (WHO). The experience of physical or sexual violence can negatively impact a woman's success and ability to achieve empowerment; for example, by reducing her ability to access education, employment and/or impacting her ability to care for her family. In some countries, this violence means a woman is at an increased risk of acquiring a sexually transmitted infection or experiencing mental health issues. Though the economic cost of this violence is difficult to assess, it is estimated to be several billion dollars annually in countries such as the United States of America (USA) or Canada (Status of Women

Canada Report, 2015). To support women in this regard, approximately 119 countries have laws regarding domestic violence, while 125 countries have passed laws regarding sexual harassment.

Though the terms gender equality and empowerment are often used interchangeably, a distinction of their meaning is crucial to understanding the issue. While gender equality focuses on the inherent fairness and distribution of resources and opportunities between females and males, empowerment is concerned with the bigger picture, such as how to enhance the decision-making control of women and thus the autonomy they have in everyday life. Having fair and equitable access to resources is one aspect of achieving empowerment; however, there are other considerations, such as economic and household freedom, confidence, and self-efficacy to pursue and achieve goals. Empowerment is not something that can be given or provided by others, but rather it is the process of acquiring the ability to make autonomous and strategic decisions within all life spheres. Ultimately, it is an individual journey, being able to assert the right to have rights and to act independently (Cornwall & Rivas, 2015; Wahlin, 2017).

1.2 Research Question

Using a scoping review methodology, the following question for this research was addressed: What is the impact of ICTs on the level of women's empowerment worldwide?

1.3 Theoretical Framework

The theoretical framework selected and adapted for this study provided a guide as to how the concept of women's empowerment and the contextual nature of ICTs are organized and linked together. Related to the scoping review methodology, this framework assisted in identifying and organizing the gaps within the resulting evidence. Figure 1.1 illustrates the adapted theoretical framework pyramid, originally created by Malhotra, Schulte, Patel, and Petesch (2009).

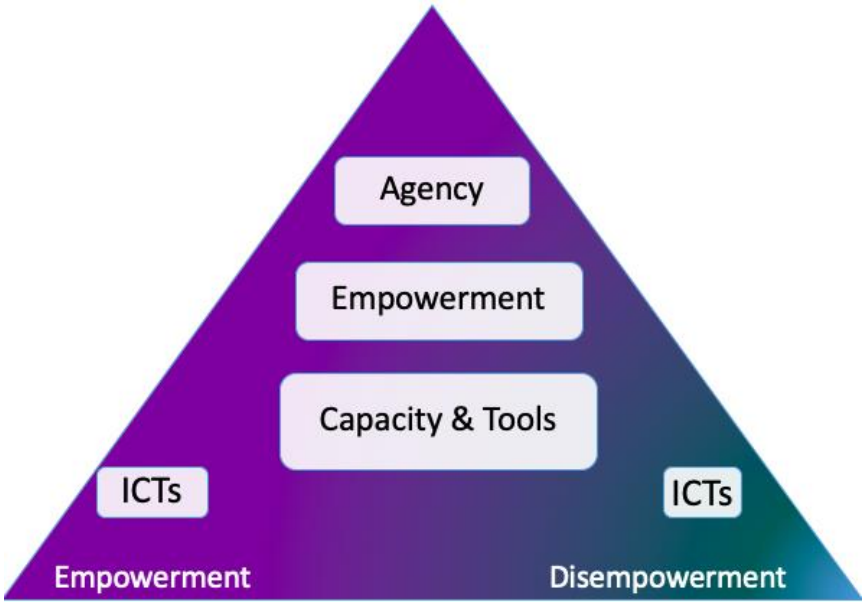


Figure 1-1. *The adapted Malhotra, Schulte, Patel, & Petesch Pyramid (2009)*

The pyramid, as proposed by Malhotra, Schulte, Patel, and Petesch (2009), reflects the structure and progression of the stated research question. It is akin to Maslow's hierarchy of needs in that the bottom of the pyramid is the foundation and continues to build upon and progress to a higher level of functioning; each level must be satisfied before an individual can progress to the next (Poston, 2009). This process of moving up the pyramid is not linear in nature but rather women can move forwards and backwards as the contextual factors, such as ICT, influence aspects of their life. Rather than focusing on needs, this framework focuses on basic human capacities and resources and how individuals utilize and build upon them to move forward and upward in society. Exploring women's empowerment begins with examining current internal and external resources and utilizing contextual forces to build those tools to a level of autonomy that is not based on or influenced negatively by gender or sex. The foundational capacities and tools indicated at the bottom of the pyramid increase the ability of women to be aware of and to access the resources required to positively impact their health and environment. These capacities and tools could be social relationships, literacy, self-confidence, level of

household income, or access to secure housing.

The second level of the pyramid is empowerment which is based on the principle that women should have equal access to life choices and opportunities and not face major obstacles, based on gender that would prevent them from accessing these resources. This level assumes that women can be supported by external, internal, and contextual factors enabling them to improve and build on the capacities and tools available to them. This progress empowers women with the opportunity to attain the self-confidence and self-efficacy required to make strategic life choices (Malhotra et al., 2009). Such choices may include access to, and control over, household resources and decisions, access to employment, and access to education.

At the top of the pyramid is well-being and agency – perhaps the most difficult objective for women to actualize, as it requires a transformational change of societal views and practices. This is where self-efficacy and capacity come together to inform autonomous decision making. Well-being and agency for women can be described as experiencing an optimal level of nutrition, income, health, and/or life span (Malhotra et al., 2009). Well-being and agency also include making strategic life choices, having self-efficacy, and being empowered by securing freedom and control over resources for one's self and family (Kabeer, 1999). It is the transformational change in political institutions, health care systems, family systems, and social roles that result in a foundation for sustaining women's rights and empowerment (Grabe, 2011; Kabeer; Malhotra et al.). This level is not attainable without the collaboration and invested interests of society as a whole.

The progression and growth through fundamental capacities to well-being and agency is impacted and supported by a number of internal, external, and contextual factors. To enhance the discussion of women's empowerment, the master's candidate adapted the Malhotra, Schulte,

Patel, and Petesch Pyramid (2009) to reflect the supportive nature of ICTs as a key contextual factor in supporting women's empowerment. This adaptation allowed for the utilization of ICT as the context within each of these steps could potentially contribute to a woman's ability to build her capacity and her access to resources. Beyond the contextual factors and levels of empowerment, exists the state of women as both empowered and disempowered individuals. As per Kabeer (1999), for one to know empowerment, one must have experienced oppression. According to Statistics Canada (2014), with the emergence of technology and with frequent use of handheld devices, women are more likely to be harassed, stalked, and victimized by technological means. Information and communication technologies as a contextual factor could be implicit in supporting and promoting women's empowerment, but also have the potential to be utilized as a means to continue suppression.

1.4 Significance

Women's empowerment and ICTs have been the subject of global goals, discussions, and debates for many decades. On a global scale, certain populations of women are at a disadvantage within society in terms of income and access to full-time employment and experience a high rate of intimate partner violence. Currently, there is a lack of reliable and current sex-disaggregated data to indicate the gender differences in the use and access of technology. There is also a lack of gender inclusion and sensitivity in policy development (Brimacombe & Skuse, 2013; Doss, 2014; Shade, 2014). As the impact of ICTs on women's empowerment can be both positive and negative, specific, and targeted research was required to clarify this influence. To make recommendations for changes to the creation and development of policies and relevant programs, a review of the extant evidence was undertaken to determine how ICTs have played a role in the level of achievement of women's empowerment.

Chapter 2 Review of the Literature

2.1 Women's Empowerment

Rooted in the work of Paulo Freire, the term women's empowerment first came into use in the 1970s, as a way to acknowledge social justice and gender equality (Freire, 1970; Grabe, 2011). The term evolved in the 1990s as various agencies began to use it in the efforts to combat structural inequities within society and to integrate women's issues into political, health, and social agendas (Grabe). It was applied to women who were oppressed and lacking the freedom of choice and action to shape their lives. In more recent years, the term women's empowerment has been used as an outcome of measurement and a goal to be achieved by various global organizations in order to balance the scales of gender equality and equity. The term 'gender equality' refers to the equal balance of available rights, resources, and opportunities, specific to one gender due to being born male or female (Women Like Us Foundation, 2018). For women, this imbalance is reflected in unequal access and opportunities for educational experiences, as well as the opportunity to pursue a career, to access health services, or to obtain full time employment. Gender equity, however, factors in the fairness of resource distribution, in conjunction with the respective need of individuals, and implies that this equity could be brought about by societal conditions and is thus avoidable (WHO, 2017). These two concepts are inextricably linked; to ensure that resources and opportunities are not provided solely based on gender means, first, opportunities and resources must be equally available and secondly, resources must be available appropriately based on who requires it the most.

Within the evidence, the only agreement regarding the term empowerment is that the definition is ambiguous and lacking definitive characteristics. Samman and Santos (2009) contended that the concept of empowerment is multidimensional, grounded in culture, and is

most often used to explore the relative position of women to men and the potential consequences of an imbalance. Eyben and Napier-Moore (2009) provided a slightly broader definition stating women's empowerment is "about choice, decision making, realizing opportunities and potential and community action" (p. 7). Narayan's (2005) definition asserts empowerment is the "process of enhancing women's capacity to make effective choices, and to transform those choices into desired actions and outcomes" (p. 4). The most comprehensive and widely accepted definition (Grabe, 2011; Mosedale, 2014) comes from Kabeer (1999) who stated that empowerment is "the process by which those who have been denied the ability to make strategic life choices, acquire such an ability" (p. 437). A key concept within Kabeer's definition is the emphasis on the process (Grabe; Kabeer; Mosedale, 2005). The construct of empowerment is not a product or outcome that women can achieve; rather, it is a process of change focused on freedom, choice, and the agency of women. The term empowerment is based on the previous condition of disempowerment (Kabeer). Women cannot acquire the ability to make choices and become empowered if they were not previously denied that capability.

Kabeer (1999) describes three levels of contextual factors that are crucial for women to achieve empowerment: resources, agency, and achievement. This triad is also reflected in the Malhotra, Schulte, Patel, and Petesch Pyramid (2009) as the platform illustrates capacity and resources as the foundation on which empowerment and agency are achieved. Resources include both material as well as human and social resources, as pre-conditions that set the stage for agency and achievement. Kabeer originally described the second factor, agency, as the ability to define personal goals and act upon them. Agency refers to women's aspirations, self-efficacy, capability, and reflecting their control over crucial resources (Kabeer). The final factor is achievement or outcomes of positive well-being which has a direct impact on women's homes,

work, and social lives. This differs from the Malhotra, Schulte, Patel, and Petesch Pyramid (2009) in that Kabeer has placed agency within the second level and used the terms positive well-being for the final stage.

Mosedale (2005) echoed Kabeer (1999) and Grabe (2011) in the components of empowerment but expanded on the construct proposing four aspects inherent in the term empowerment. Firstly, Mosedale agreed that to be empowered, one must first be disempowered. Secondly, a woman cannot achieve empowerment through a third party (Mosedale). While conditions favourable to empowerment can be created through social policy and programs, the process of empowerment must be undertaken and actualized on an individual level. Thirdly, empowerment must focus on the decision-making matters of the individual and the importance of being able to carry those out (Mosedale). For example, if education for one's children is a matter of great importance, women should not only be able to decide to send children to school, but also have the means and capacity to carry forward that decision. Lastly, Mosedale agreed with Kabeer in stating that empowerment is an ongoing process without a final goal and without an absolute sense of achievement. This understanding underscores the importance of pursuing the transformational changes needed within society to support this outcome.

While there is agreement that women's empowerment is a difficult, if not an impossible, construct to measure and evaluate (Grabe, 2011; Kabeer, 1999; Mosedale, 2005; Narayana, 2005), Longwe (1991) created a framework that conceptualizes the process of women's empowerment through a levelling of actions. The Longwe framework assists program developers in understanding the practical meaning of women's empowerment and also acts as a guide in understanding the various levels of empowerment that result from project and program implementation (Longwe). The five levels in the Longwe framework are welfare, access,

conscientization, mobilization, and control. Welfare focuses on improvement in socioeconomic status, such as income, nutrition, or housing. At this level, women are passive recipients, and are not “active creators [or] producers of their material need” (Longwe, p. 2). This level does not empower women (Longwe) but rather frames their current circumstance. The gap in resources identified in the previous stage lead into the second level of the Longwe framework. A lack of resources can contribute to an inequality in access to opportunities, information, and other assets that have the potential to act as a means to empower women. At this level, empowerment means women are aware of the gender gap in resources and are motivated to take action against it (Longwe). The third level is conscientization and focuses on social change as the outcome. Women, at this level, use their understanding and awareness of the gender gap and gender roles as a way to even the power imbalance (Longwe). They begin to gain equal access to land, capital, labor, and production (Longwe). The final stage is mobilization and Longwe summarizes this stage by emphasizing “power expands in numbers and connection" (p. 2). This is a crucial stage in the evolution of empowerment as it brings women together as a collective to address and act on the issues of inequality related to the gender gap (Longwe). This stage is where programs are designed, developed, implemented, and evaluated. Though Longwe originally intended the framework to be a linear process, recent evidence on the achievement of women’s empowerment suggests that it can also be considered cyclical. Moving from stage to stage can be impeded by external forces causing women to falter and move back and forth between the steps before finally progressing forward. While the Longwe framework was originally intended for program planners, in the context of this scoping review, it informed the understanding as to how empowerment can be categorized and levelled.

2.2 Information and Communication Technologies Conceptual Review

Information and communication technologies have evolved from basic radio and television to social media and mobile handheld devices that have the capability to provide networking, communication, and a variety of information across the globe. The emergence of internet-based technology has changed the way people connect with each other and how they access information. This evolution in communication and technology has broadened the issues surrounding access to ICT as well as how this technology can be used to support or oppress populations. For example, access to a device that supports an internet connection can provide anonymity and self-expression to a wide range of people who would otherwise be isolated and oppressed (Gurumurthy, 2006). Using the internet can also provide health information to those who are isolated and without access to health care services.

2.2.1 definitions and uses.

According to the Miriam Webster Dictionary, there is no definition of ICT; however, the components of this concept can be defined separately. Information is defined as having knowledge or receiving knowledge (Miriam Webster, 2018a); communication is defined as the dissemination of that knowledge (Miriam Webster, 2018b) and technology is defined as the medium for how information is transmitted and disseminated including a product, device, or application through which the knowledge is conveyed (Miriam Webster Dictionary, 2018c). The Oxford English Dictionary (2018) also does not provide a definition of ICT; however, there are three entries associated with the concept. The first entry is dated 1986 and states "individuals working in the information technology applications area have been included if they reflected an interest in the social science aspects of ICT" (para. 1). The second entry is dated 2002 and states "ICTs therefore include equipment such as radio, telephone and fax... spanning a continuum

from the more ‘low-tech’ to the more ‘high-tech’” (para. 2). The third entry is dated 2015 and states, “showcase this region as a rapidly growing ICT hub with an abundance of smart businesses and tech-savvy young talent” (para. 3). These entries suggest the term is broad in nature and can include a process, a sector of work, equipment, or product. Synonyms for “ICT” via a thesaurus were not found but there was an entry for Information Technology (IT) which was stated as synonymous with data processing.

Statistics Canada (2018b) includes a section describing ICT but does not include a definition of the concept but rather the sector. The sector is defined as the “special aggregation of industries primarily engaged in producing goods or services, or supplying technologies, used to process, transmit, or receive information” (para. 1). It also provides a breakdown of sub-topics, related to ICT that includes business and government/individual/household use, telecommunications and industries, as well as television and radio industries (2018). TechTarget (2018), a popular technology and innovation blog, defines ICT as “all devices, networking components, applications and systems that combined allow people and organizations … to interact in the digital world” (para. 2). Similarly, IGI Global Disseminator of Knowledge (2018) asserts that ICT is an umbrella term meant to indicate the various avenues for the communication of information. It refers to two components where IT or information technology refers to computer hardware and software, and tablets, while the CT or communication technology refers to internet capabilities including smart phones.

Commonly, ICTs are discussed based on their use and applicability to a specific field or discipline, acknowledging the lack of a consistent definition of ICTs that are not attached to a sector. The definition is often based on the relation to education, where ICT supports teachers’ use of innovative pedagogy, to enhance student engagement, and to improve teaching and

learning spaces (Almerich, Orellana, Suárez-Rodríguez, & Díaz-García, 2016; Drossel, Eickelmann, & Schulz-Zander, 2017; Haji, Moluayonge, & Park, 2017; Howard, Ma, & Yang, 2016; Ottenbreit-Leftwich, Kopcha, & Ertmer, 2018; Sipilä, 2014). There is consensus within the education sector that ICTs provide opportunity for educators to strive towards innovative teaching and learning spaces (Ottenbreit-Leftwich et al.; Sipilä). Information and communication technologies require a more complex process of pedagogical reasoning and can increase the competence among educators using it in their classroom (Almerich et al.; Haji et al.; Sipilä). The opportunity to involve students in a higher level of creative and engaged learning can be achieved through ICT innovation (Concannon, Flynn, & Campbell, 2005; Howard et al.; McCabe, 2014; Wanner & Palmer, 2015). Though there is no shortage of evidence to support the use and importance of ICTs in the education sector, there are no definitions of ICT within this sector to clarify these uses in higher education.

Information and communication technologies have also been frequently utilized within health care practice across all health-related disciplines such as nursing, physiotherapy, and pharmacy. Information and communication technologies have found a place in health promotion and health education within acute and community contexts (Bert, Giacometti, Gualano, & Siliquini, 2014; Clarke, Kuosmanen, & Barry, 2015; Haluza & Jungwirth, 2015; Jane, Hagger, Foster, Ho, & Pal, 2018), for example, using social media or text messaging health apps to deliver health education to otherwise difficult to reach populations. The evidence supports the continued evaluation of the challenges and opportunities in utilizing ICT in health contexts (Dalton et al., 2014; Hopia, Punna, Laitinen, & Latvala, 2015; Ross, Stevenson, Lau, & Murray, 2015; Sultan, 2014). For example, within nursing practice, ICTs have been used to evaluate and improve patient-centered care, enhance quality of care, and educate patients, families, and

interprofessional health care teams. Challenges to the use of ICT includes concerns regarding confidentiality and the increased cost of obtaining devices and maintaining and updating infrastructure and networks.

Information and communication technologies used in healthcare include any and all digital technologies that can capture, store, process, and exchange information to promote health and prevent illness (Bashshur et al., 2009; Gagnon et al., 2012). Nurses utilize ICT as management and communication systems to receive, store, and transmit patient and health data such as the electronic patient record (Koivunen & Saranto, 2018; Rouleau, Gagnon, & Côté, 2015; Sundberg, Eklöf, Blomberg, Isaksson, & Wengström, 2015). Computerized decision support systems enable evidence-based nursing practice by providing accurate and current clinical guidelines or care pathways (Martinez-Brockman, Shebl, Harari, & Perez-Escamilla Martinez, 2017; Rouleau et al.). Information and communication technologies can enhance nurses' critical thinking skills, thus improving overall decision making and patient outcomes (Nilsson & Fagerström, 2018; Sedgwick, Awosoga, & Grigg, 2017). Information and communication technologies support access of patients, families, communities, and students to current health information and educational content (Rouleau et al.). Access to current and accurate evidence can influence nursing job-satisfaction and empowerment (Rouleau et al.) while providing support for nursing interventions and their evolution based on best practice guidelines (Registered Nurses Association of Ontario, 2018).

In recent years, ICTs have been used to address broader social and contextual issues within society (Pinto-Bruno, García-Casal, Csipke, Jenaro-Río, & Franco-Martín, 2017; Scheerder, van Deursen, & van Dijk, 2017). The use of ICT has focused on information access and how technologies can be delivered to, and utilized by, various populations and communities.

Specifically related to the purview of this scoping review, the use of ICTs was focused on how to address gender inequities and empower women. A digital divide has emerged as ICTs have become ubiquitous growing in both type and access. This divide parallels gaps found in social contexts, such as income and education, as those who use and benefit from technologies access other resources more readily than others (Dixon et al., 2014). This divide widens the gap for inequities and inequalities among already disadvantaged populations based on gender, age, disability, or socioeconomic status (Fang et al., 2018; Goodman-Deane et al., 2017; Pagán, Martínez, & Máiquez, 2018; Rowsell, Morrell, & Alvermann, 2017; Singh, 2017; Van Dijk, 2017). Worldwide in 2013, 200 million more men had access to the internet than women (Intel, 2013). Women use ICTs much less frequently and intensely than men (Hilbert, 2011; ITU, 2017; Ono & Zavodny, 2009; Wasserman & Richmond-Abbott, 2005); however, the evidence lacks sufficient depth and detail as to exactly how ICTs are being used by women and why they use it less frequently. According to Hilbert, statistical data collected from the World Internet Project in 2009 concurred with these findings. The latest data available for ICT usage in Canada showed 81% of males and 80% of females were online in 2009, which has increased from the 79% and 75% respectively in 2007 (Statistics Canada, 2009; World Internet Survey, 2009). A comprehensive study completed regarding the intensity of internet usage across Canada indicated that women are much less intense users than men (Middleton, Veenhof, & Leith, 2016). Worldwide in 2013, the percentage of men to women who used the Internet was 41% to 37% respectively (ITU). This variance may be attributed to the level of comfort felt by women but also to the increased time-stress (Middleton et al.) that women experience due to the likelihood of being a single parent, working part time, and with the inability to afford quality daycare.

Data are often not sex-disaggregated and, as result, it is challenging to distinguish issues

related to gender that are inherent in the use and access of ICTs (Brimacombe & Skuse, 2013; Doss, 2014). This, in turn, can make policy and program development that is geared towards supporting and empowering women difficult. Data that are not aggregated by sex cannot adequately inform policies due to the differing needs for women and men. The analysis of these sex-disaggregated statistics could lead to improvements in social and economic developments and could potentially assist in the full participation of both women and men in the use of, and access to, ICTs leading to a more positive impact of these technologies.

The empowerment of women through ICT has been a focus of conference agendas since the 1995 World Conference on Women: Beijing Declaration and Platform for Action (Brimacombe & Skuse, 2013; Gurumurthy, 2004). These meetings were the first to discuss the inclusion of women in the information society and the importance of women's empowerment in connection with ICT and since then, several more meetings have occurred to track this progress. The World Summit on the Information Society (WSIS) in 2005 declared **"…**that the full participation of women in the Information Society is necessary to ensure the inclusiveness and respect for human rights within the Information Society" (p. 4). Despite this intention, the status of women's inclusion and participation in the use and implementation of ICT has been "gloomy" (WSIS, p. 2). In 2016, the ITU (2017) stated that the percentage of women gaining access to ICT is actually regressing – with women utilizing ICTs 11% less than men in 2013 and 12% less than men in 2016. The most recent report did not comment on how these gaps have changed in 2017, only stating that the overall proportion of internet usage for women was 12% lower than men (ITU). This commentary is also reflected in the current SDGs, as a key goal of Target 5 is to "enhance the use of enabling technology, in particular information and communication technology (ICT), to promote the empowerment of women" (UN, 2015, para 1). Though data are

lacking in specific details, many authors agree that improved access to ICTs can assist in providing women with employment resources and opportunities that could narrow the gender wage gap, assist in making education and health information more accessible, contribute to the end of violence against women, and lead to women's empowerment and leadership (Brimacombe & Skuse, 2013; Gill, Brooks, McDougall, Patel, & Kes, 2010; Gurmurthy, 2006; Weiss & Tarchinskaya, 2015).

2.2.2 attributes, antecedents, and consequences.

2.2.2.1 attributes.

Defining the attributes of a concept is identifying the crucial characteristics that aid in the distinction of one concept from another that is similar (Walker & Avant, 2005). The key defining attributes of ICTs are: (1) data, audio, video, or text that is input or output by the system; (2) devices that contain software applications to interpret data; (3) the presence of people or users to interact with the system; (4) exchange of data between users and devices; and (5) networks that connect the previous attributes to the digital world. These ICTs include technological devices that have the ability to access an internet connection, such as smartphones, mobile phones, tablets, laptop computers, and desktop computers.

For the purpose of this scoping review, ICT was defined as a system of devices, networks, and applications that combine to allow for the exchange of data, in all of its forms, between users and devices, across the internet and related networks.

2.2.2.2 antecedents.

Walker and Avant (2005) define antecedents as the events or attributes that must occur prior to a concept's manifestation. The aforementioned attributes all have to exist before ICT can follow, thus causing some overlap. However, for ICTs to be utilized to its fullest potential and as

outlined in the previous sections, the first occurrence must be the creation of infrastructure that supports networks and connections to the digital world. Secondly, ICTs must be accessible and affordable to users via devices, such as computers or smartphones. Thirdly, user participation is fundamental to the idea of the exchange of information, knowledge, and capability. This capability to use and understand ICTs, as well as its components, is a necessity. The continuous evolution of ICTs suggests that research and development is a crucial antecedent, one which is non-linear in nature. Research and development of new innovations occurs simultaneously to the utilization of ICTs across sectors.

2.2.2.3 consequences.

Consequences are those events that happen as a result of the concept's operationalization. Typically, these consequences are positive in nature and can stimulate new avenues of thought for future research (Walker & Avant, 2005). Positive potential consequences of the use and development of ICTs can include information access for users, enhanced knowledge, development of support networks, enhanced self-efficacy, and improved opportunities for education, employment, and health care. Alternatively, negative consequences can include the use of ICTs as a means to exact control over another individual, access to information that is not credible, as well as various associated costs.

2.2.3 conclusions.

This brief conceptual review has identified the various scholarly and non-scholarly definitions and uses of the concept of ICT. It is understood to be an umbrella term, fairly broad in nature, and applicable across many sectors, professions, and disciplines. Thus, it can be defined as a system of devices, networks, and applications that combine to allow for the exchange of data, in all of its forms, between users and devices, across the internet and related

networks. The next step in the development of this concept was to view its applicability in the scholarly context with empirical research studies that support its use.

2.3. Health and Digital Literacy

For women to adequately manage their health it is imperative to have access to the most relevant and available health information and services. The concept of health literacy can be defined as the ability of an individual to "access, understand, evaluate and communicate information as a way to promote, maintain, and improve health in a variety of settings across the life course" (Rootman & Gordon-El-Bihbety, 2008, p. 11). The WHO (2018) states that health literacy can be the "motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health" (para. 2). It is more than the act of reading health related information but includes the capability to demonstrate improvement through health information access and to use this information to take action (WHO). Further building on this concept, the Center for Disease Control ([CDC], 2016) provides an outline of how health literacy skills build capacity in terms of outcomes. While health literacy can be seen as the ability to find information, it also includes the ability to communicate specific needs and preferences, as well as to understand the impact, context, and consequences of health decisions (CDC).

Health literacy is a crucial resource for everyday living and can have a significant effect on the health outcomes of all individuals. Evidence shows that low literacy rates are linked to levels of education, age, and low income and can act as a risk factor for poor health outcomes (Bostock & Steptoe, 2012; Moser et al., 2015; Muller et al., 2017; Omachi, Sarkar, Yelin, Blanc, & Katz, 2013; Yamashita, Bailer, & Noe, 2013). In Canada, 60% of adults are not health literate and cannot use available health information provided by the media, schools, or health care

facilities (PHAC, 2014). Worldwide, statistics from 1985 to 2016 indicate the overall rate of youth literacy increased from 83% to 91% (United Nations International Children's Emergency Fund [UNICEF], 2018). However, a gender gap does exist with young women accounting for 59% of the illiterate population across the world (UNICEF).

With the emergence of internet-based technology, health information has become readily available for review. eHealth is a relatively new concept that refers to the use of emerging ICTs for the promotion and delivery of health and health care (WHO, 2016). eHealth provides new methods for using and distributing health resources and aims to increase the efficiency of these resources (WHO). The internet plays a large role in eHealth, as it provides a platform for access to, and dissemination of, health information and encourages the interaction and collaboration of patients, nurses, health care professionals, and the general public (WHO). Due to the increased role technology plays in the distribution of health information and services, it is important to consider the digital literacy skills of women accessing that information.

According to Glister (1997), digital literacy can be defined as "the ability to understand and use information in multiple formats from a wide variety of sources when it is presented via [technology]" (as cited in Lankshear and Knobel, 2006, p. 13). To be comprehensive and to align with how ubiquitous technology has become, digital literacy also includes the ability to think critically and adapt skills from one medium of technology to another (Buckingham, 2015). The term digital literacy is also commonly discussed with regards to how it links with health literacy (Rootman & Gordon-El-Bihbety, 2010; Sherwood, 2017) and how it directly relates to a woman's ability to utilize current technologies (Kasemsap, 2018; Lyles & Sarkar, 2015; Neter & Brainin, 2012). Where health literacy is concerned with understanding and acting on received health-based information, digital literacy involves the knowledge and skills to engage with

technology and the ability to navigate and locate relevant health information.

Digital literacy is a complex concept and is inextricably linked to how an individual functions day to day; for example, job applications, transferring money, research for a school paper, or paying bills. Being able to function confidently and comfortably with technology is a measure of one's digital literacy (Buckingham, 2015). Therefore, the ability of a woman, already disempowered by social factors, to navigate health information and to engage with the health care system can have a significant impact on her health outcomes.

2.4 Summary

Increasingly, ICTs are being used as a tool to provide access to health services in a community setting. One of the basic principles of community health nursing is building capacity and facilitating the resources needed for community members to empower themselves to act in a way that contributes to healthy living (WHO, 2018). The poor health and lack of autonomy of women in a community can be an indicator and contribute to the overall poor health outcomes of the community (Banda, Odimegwu, Ntoimo, & Muchiri, 2016; Singh, Bloom, & Brodish, 2015). Women of poor socioeconomic status, who experience barriers to accessing ICTs, cannot utilize these opportunities and avenues for healthy living. Social determinants of health can be described as having a multiplier effect on individuals, families, and communities who experience unfavourable social circumstances (Dietrich Leurer, Abonyi, & Smadu, 2013). Syndemics theory supports the idea that these determinants of health, such as gender, health services, and education, coexist and interact to adversely impact the overall health of a community (Singer, 1994). The use of ICTs can increase household earnings and contribute to better health, nutrition, and educational outcomes for children and can increase overall wellbeing for women and children (Hilbert, 2011; Kularski & Moller, 2012).

Access to, and utilization of, ICTs directly influences the principles of population health promotion, specifically empowerment and public participation (PHAC, 2012a). Women are less likely to be healthy if they lack the control and choice to access health resources necessary to engage fully with society. Women who have control over life choices have an increased chance of equitable access to tools and resources that can contribute to heathy living (PHAC, 2016). Information and communication technologies can transcend the barriers of traditional health care services by, for example, providing heath assessments and check-ups via distance using remote monitoring or delivering health education via social media or blog. Information and communication technologies can promote health, provide chronic disease management online and at home, and enable health care provider consultations via distance. Information and communication technologies have the potential to increase access to health services, regardless of rural, remote, or urban locations in developed or developing countries.

Chapter 3 Methodology

This chapter outlines the rationale for choosing a scoping review as a method of answering the stated research question, as well as describing the Arksey and O'Malley scoping review framework. The six stages of the scoping review framework and corresponding undertakings are described.

3.1 Study Purpose and Aims

The purpose of this research was to explore the breadth of existing evidence on the use of ICTs and their impact on the level of women's empowerment worldwide. The objectives of this research were to identify:

1. The published and grey literature on ICTs and their impact on women's empowerment and to identify the extent, range, and scope of evidence;
2. The links or connections made within the evidence regarding the impact of ICTs and how they are being used to address women's empowerment or disempowerment; and
3. The gaps in knowledge and research on this topic, including a nursing lens, at the individual, community, and global levels.

The findings contributed to an understanding of the connection between ICTs and the empowerment of women. Gaps and opportunities in the existing evidence were identified for future research as well as potential program and policy development. This research contributes to the current North American and global literature on the use of ICTs in the promotion of women's empowerment and illuminates how the usage of ICT as an intervention in women's lives has been operationalized. Given the rapid evolution from radios to smartphones and from telegraphs to apps, the potential rate and impact of ICT innovations to support and empower women across the globe are exponential.

3.2 Rationale to Support a Scoping Review

A scoping review is a form of knowledge synthesis, largely based on the methodological framework of a systematic review, which is performed in a rigorous and transparent way (Armstrong, Hall, Doyle, & Waters, 2011; The Joanna Briggs Institute [JBI], 2015). The scoping review is considered a stand-alone research project, especially when conducted in an area that has not yet been comprehensively reviewed (Arksey & O'Malley, 2005). Many authors agree that a clear and concise definition of the scoping review is lacking within the evidence (Arksey & O'Malley; Davis, Drey, & Gould, 2009; Levac, Colquhoun, & O'Brien, 2010); however, a consensus as to its purpose is well-defined. The goal of a scoping review is to collect all relevant published and unpublished studies to provide a broad overview of the key concepts and to identify the main sources and types of evidence available (Arksey & O'Malley; Mays, Roberts, & Popay, 2001). This type of review is guided by a broadly formed research question which directs the development of the inclusion/exclusion criteria and informs subsequent search methods. Use of such a far-reaching question aims to explore and discover more specific questions that could be posed and addressed in subsequent research (JBI).

The original scoping review framework was developed by Mays et al. (2001) and further advanced by Arksey and O'Malley (2005). The latter Arksey and O'Malley framework has the necessary level of rigour that is associated with primary research (Armstrong et al., 2011; Colquhoun et al., 2014; Landa et al., 2011). While systematic reviews have typically been considered the gold standard of knowledge synthesis, scoping reviews have gained validity as a methodology. Many publications continue to align the scoping review methodology with systematic review methodology (Arksey & O'Malley; Armstrong et al.; Landa et al.). These two reviews share many similarities, most notably the level of rigour, transparency, and

reproducibility in the search protocol (JBI, 2015). Equally important are the differences that make the scoping review a unique and credible methodology. Within a scoping review, the research question and type of evidence are more broadly reviewed, compared to the narrow focus of the systematic review (Arksey & O'Malley). In keeping with the intent to rapidly review all available evidence, the resulting publications are not assessed for quality (Arksey & O'Malley). Furthermore, a scoping review allows for increased flexibility and is not as linear a process as the systematic review (Arksey & O'Malley). Rather it is an iterative process and authors are encouraged to redefine search terms and search methods as they become more familiar with the available evidence.

There are several reasons why a scoping review can be used to map the evidence; however, the primary outcome is to provide comprehensive coverage on the breadth of available evidence. Arksey and O'Malley (2005) cite four common reasons why a scoping review might be undertaken: (a) to examine the extent, range, and nature of a research area; (b) to determine the value of completing a subsequent systematic review; (c) to summarize and disseminate research findings; and (d) to identify gaps in the existing evidence. This study was undertaken to examine the extent, range, and nature of the stated topic and to identify gaps within the evidence and highlight potential opportunities for further research.

3.3 Arksey and O'Malley Scoping Review Framework

The scoping review framework, as per Arksey and O'Malley (2005), is comprised of five steps with an optional sixth step: (a) identifying the research question, which was the starting point of the study and, as such, guided the subsequent search strategy; (b) identifying relevant studies, which involved the development of a comprehensive search strategy to ensure accurate and complete results; (c) selecting studies, which involved developing a-priori inclusion and

exclusion criteria that were revised throughout the review, as familiarity with the evidence increased; (d) charting the data, which involved charting and sorting key material from the results into themes and trends; (e) collating, summarizing, and reporting the results, which involved presenting the results as a visual and/or narrative; and finally, (f) consulting with relevant stakeholders. Arksey and O'Malley indicate the sixth step is optional and choosing to perform it should be balanced with the feasibility of the study, including required time constraints and resources available (see Table 3.1). For the purposes of this research and considering the shorter timeline and scope of the study, the sixth step of consulting with relevant stakeholders was not performed. It should be noted that, in conjunction with the Arksey and O'Malley framework, the JBI guidelines for undertaking a scoping review were also consulted. Approval from the Behavioural Research Ethics Board was not required for this study as the information retrieved was publicly available.

Table 3-1: *Arksey and O'Malley Scoping Review Framework*

Arksey and O'Malley Stages	**Actions Included in Each Stage**
Identifying the research question	Starting point of the study that guides the subsequent search strategy
Identifying relevant studies	Developing a comprehensive search strategy to ensure accurate and complete results
Selecting studies	Developing a-priori inclusion and exclusion criteria that were continually revised
Charting the data	Charting and sorting key material from the results into themes and trends
Collating, summarizing, and reporting	Presenting the results as a visual and/or

	narrative
Consultation	Consulting with relevant stakeholders

3.4 Methodological Approach

3.4.1 research problem (Stage 1).

To ensure transparency, rigour, and consistency, an a-priori protocol was developed. The scoping review methodology was conducted by a team of individuals with multi-disciplinary capability in nursing, knowledge synthesis, and ICTs. This scoping review was conducted to answer the following question: What is the impact of ICTs on the level of women's empowerment worldwide? In keeping with the intent of the method, terminology within the research question was intentionally broad.

3.4.2 search strategy (Stage 2).

The main intent of a scoping review is to be as comprehensive as possible in identifying relevant published and unpublished studies from the evidence. To ensure identification of relevant and suitable publications, a search strategy was developed to retrieve evidence from a variety of sources. As per Arksey and O'Malley (2005), the following avenues were reviewed as part of the search strategy: searching relevant electronic databases, reviewing reference lists of pertinent articles, and hand searching key journals. The search strategy and selection are typically undertaken by a team of individuals. This study was undertaken by the candidate with input and participation of members of the Student Advisory Committee (SAC) and a University of Saskatchewan librarian (herein referred to as the librarian). A Committee member, with experience and expertise in the scoping review methodology, was consulted throughout the study to ensure rigour and alignment with the proposed Arksey and O'Malley scoping review framework. The librarian was consulted throughout the search term selection process to ensure

completeness and accuracy of search terms leading to a comprehensive and complete search strategy. This process was iterative resulting in a number of meetings that occurred throughout this aspect of the study.

The databases for the search were decided in consultation with the librarian and demonstrated relevance to the research question and topic area. A publication timeframe was determined, as per the inclusion criteria, to narrow the range of years that were searched for relevant studies. Search terms were drawn from the research question and expanded upon based on a cursory search of two databases (aligning with the recommendations from the JBI). To determine the range and breadth of key terms, an initial limited search of two databases was conducted yielding several papers. These papers were then analyzed for similar keywords, definitions, analogies, and index terms that were relevant synonyms to the initial search words (Canadian Institute of Health Research [CIHR], 2010; Landa et al., 2011). These additional terms were added to a master list that informed the final search strategy. Landa et al. recommended repeating this process until no new iteration of search terms was found. At this stage, the search terms were considered complete and applied to the final search (see Appendix A).

The ability of the electronic database search to identify all relevant primary research was verified by hand searching the reference lists of eight key peer reviewed articles and nine key electronic journals that were flagged through the initial test search as well as the main search. The journals were chosen based on their relevance to the research question as well as their scholarly nature. The initial three identified journals were: *Community Informatics, Gender and Development,* and *Journal of Women in Culture and Society.* Subsequent journals were identified and selected for a hand-search once the initial search was completed. These were*: Gender,*

Technology & Development, *Computers in Human Behaviour*, *American Journal of Health Behaviour*, *American Journal of Public Health*, *Women's Health Issues,* and *Empowerment Women for Gender Equity*. These journals were then evaluated for additional research potentially absent in the database search. Though scoping reviews do not assess the quality of each study, an effort was made to include only reputable, authentic journals. From this process 78 peer-reviewed articles were identified and added but later eliminated using the inclusion and exclusion criteria.

To ensure the search was comprehensive, the following databases, available via the University of Saskatchewan library, were searched on November 30, 2016 and updated on January 1, 2018: Scopus, Embase, ABI Inform, Soc Index, Sociological Abstracts, Gender Studies, Springer Link, PsychInfo, Science Direct, and Academic Search Complete. The COCHRANE Library was also searched for any relevant trials in the trial registry. The following limits were placed on the search: English only, no book reviews, publication dated 2012-2017, and the protocol was pretested in Scopus and Soc Index using select key words including "women" and "empowerment" and "technology."

In alignment with the scoping review methodology, the search was also expanded to include grey literature. Grey literature is defined by the CIHR (2010) as any study that has not been published in a book or journal and can include government or organization documents or reports, theses or dissertations, conference proceedings, and project reports. Additional grey literature was identified by hand-searching the websites of the Association for Computing Machinery Digital Library Journals and Conference Proceedings, the UN Women, Status of Women Canada, the United Nations Development Programme, the International Center for the Research of Women, the Girls Action Foundation, the Information and Communications

Technology Council, the International Telecommunication Union, and the International Development Research Center for primary research reports, guidelines, situation reports, and referenced publications that were not already included. Thirteen additional references were added to the scoping review process; many of these were guidelines, government reports, and articles that were not indexed within the electronic databases. The reference lists were then reviewed for potential additional sources. All thirteen of the grey literature articles were excluded by the final stage.

3.4.3 study selection (Stage 3).

The focus of the study selection was locating published and unpublished academic articles, which may have any type of study design, including qualitative, quantitative, or mixed methods. Books were excluded from the search strategy due to feasibility issues with obtaining them. This exclusion is supported by Arksey and O'Malley (2005) in their discussion of feasibility of the search strategy in consideration of project size and the number of available team members.

The initial pool of results included a total of 4481 citations (see Appendix B). Any potentially relevant citations that were identified by the literature search were then imported into EndNote™, a reference management software, where duplicates were removed by the program and then double checked, with manual removal by the master's candidate; the list of citations was then imported into a web-based electronic systematic review management platform, DistillerSR™. The relevance screening up to data extraction stages were conducted within this software. Two reviewers were used throughout the selection process to ensure consistency, adherence to the inclusion/exclusion criteria, as well as relevance to the research question. One of these reviewers was Dr. Pammla Petrucka, a member of the SAC who has experience with this

methodology, and the other was a Master of Nursing student who has experience as a research assistant. Dr. Petrucka will further be referred to as the independent reviewer and the Master of Nursing student will further be referred to as the research assistant. Additionally, to ensure rigour and transparency, the independent reviewer provided assistance and oversight for the categorization of data into themes and trends and the data that provided input for the visual word clouds.

Full text articles of potentially relevant citations were reviewed using a data characterization and utility form consisting of 24 potential questions designed a-priori to confirm article relevance, data utility, and extraction of the main characteristics (see Appendix C). These included title and abstract, year of publication, country of study, time of study completion, study objective, methodology used, measures used, on site or virtual for the intervention, data analysis, key findings, authors' conclusions, implications for policy and practice, types of ICTs used, types of interventions, demographics, reason for exclusion from study, empowerment definition, empowerment as a consideration for the study design, measures of empowerment, social determinants of health present and described in the study, and use of theoretical frameworks.

3.4.3.1 first review – inclusion criteria.

The inclusion criteria created for the first level of study selection were driven by the research question topics, specifically, women, empowerment, and ICTs. According to the JBI (2015), the inclusion criteria should be based on three themes, also known by the acronym of PCC: (a) participant description, (b) concept, which is likened to the phenomena of interest, and (c) context. The inclusion criteria used in the first level of selection were country of publication, date of publication (2012-2017), and the use of both of the following concepts in the title or abstract of the publication: women's empowerment and/or information and communication

technology. Synonyms for these concepts were created in consultation with the librarian to ensure a robust search strategy for maximum location and inclusion of studies.

At this stage, the master's candidate looked for the presence of the key words in the title and/or abstract. The use of these keywords as inclusion criteria were designed to be intentionally broad to provide a sense of what publications linked the two concepts (i.e., women's empowerment and ICTs). The country of publication had initially been narrowed to only include the USA and Canada; however, after the sample search was conducted, it was determined that the databases in question did not have a reliable and efficient means of filtering the search by geographical location. As a result, and to inform the global literature, it was decided by the master's candidate and agreed to by the SAC to expand the search to any country.

Prior to searching any electronic databases, a publication timeframe was determined. To ensure the feasibility of the search, specifically related to the number of possible results, the timeframe of 2012-2016 had been chosen, which was later expanded to include up to 2018 as the review progressed. This timeframe also supported the reflection of the constant evolution and emergence of new technologies, not only within North America but globally. The relevance of trends in technology from 2012 are quite different from those in 2018. To ensure retrieved publications were pertinent and applicable, this six-year timeframe was selected. The results were also filtered to include English only content.

3.4.3.2 first review – study selection.

On first review, the initial pool of articles was subjected to a staged process to ensure studies were selected that were relevant to the research question and met the inclusion criteria. Articles were first excluded based on duplication within the initial search results. This exclusion was conducted using the search tools feature within the electronic database, but also within the

reference management program Endnote™. To be thorough and to ensure accuracy, the master's candidate also went through all results by hand to ensure there were no remaining duplicates. The citation information provided for the citation by the individual database, at times was incorrect, for example, inaccurate dates of publication. A manual search revealed duplicates not picked up by Endnote™; a total of 590 were then removed and excluded from the review process. The inclusion criteria were applied to the title and abstract of the publication. Any title or abstract that did not meet the inclusion criteria was removed from further review and consideration. All articles excluded by the criteria were sent to the research assistant who confirmed the exclusion. Any disagreements or contradictions between the master's candidate and the research assistant were thoroughly discussed, with both parties having to agree to the inclusion before the publication would be added back into the pool of articles to move forward. Additionally, if an article could not be excluded based solely on the title or the abstract, the full article was reviewed for relevance to the research question and inclusion criteria. These latter two points did not prove to be an issue as there were no disagreements between the master's candidate and research assistant.

3.4.3.3 second review.

The remaining pool of articles was then reviewed a second time by applying a second level of inclusion criteria to the title as well as the abstract. This set of inclusion criteria focused on technology as an intervention in the study and women as active participants in the study versus just the word "women" found throughout the first set of criteria. At this stage, additional exclusion criteria were introduced, specifically, elimination of systematic reviews, scoping reviews, literature reviews, and program evaluations or those articles that were theory based and/or non-intervention based. At this stage and as recommended by Levac et al. (2010), the

independent reviewer considered all articles to ensure agreement, consistency, and rigour.

It is common and encouraged as part of the scoping review process to generate increased cumulative familiarity with how concepts are presented within the evidence. This, in turn, informs the decisions that are made regarding the inclusion or exclusion criteria of the subsequent stage. At the end of the second cut, it was decided that reproductive technology did not fit the previously determined definitions for technology and so articles with this focus were excluded. It was common for articles to state the use of "internet," "web-based," or "email" as a means of survey taking; this approach was not considered a technological intervention and these studies were also excluded. Articles that speculated on the potential use of technology were not considered interventions, however, those that focused on women's experiences of technological interventions were included so the results would be reflective of the absence of technology and its impact as well as the barriers to technology use in this population.

3.4.3.4 final review.

For the final review of the full text articles, based on the content and findings in the scoping review process, an additional criterion was included. The master's candidate wanted to delve into how the social determinants of health fit together and supported the concepts of women, empowerment, and ICTs. At this stage, it was noted which social determinants of health, if any, were present in each article. The remaining 59 articles all had social determinants of health present. Rather than focus on a range of these determinants, the master's candidate, with support from the Committee, decided to include all 59 articles and to then review the implications of this finding in the analysis. Of the 59 included articles, two could not be found in full text and one could only be located in the Korean language; hence, these were eliminated from consideration. The independent reviewer noted that three articles were theoretical in nature

and appeared to be intervention oriented in the abstract only so these were removed. Upon full review, another study did not include an intervention using technology and was also removed. Two more did not include the concept of empowerment as per the previously determined definition and synonyms. Finally, two other articles were identified as being evaluations of a program and not a primary study, so were removed. At this stage, it was decided to only include those articles that could be obtained via open access or through the University of Saskatchewan library. This iterative process yielded the final pool of articles for which the entire text was reviewed by the master's candidate. This final grouping of articles was then reviewed by the independent reviewer. Prior to commencing this stage, it was decided that should a disagreement regarding the inclusion of an article occur, a third reviewer (in this case from the Student Advisory Committee) would determine the inclusion or exclusion (Levac et al., 2010); however, this need did not arise. The resulting articles were then charted, summarized, and reviewed for themes and trends. On final review, both the independent reviewer and the master's candidate agreed to the exclusion of three more articles; one was a letter to the editor, one was a clinical tool not a technological tool, while the third did not focus on an intervention for the participants; thereby leaving 45 articles resulting from the initial search. The grey literature results were included within all other citations and excluded via the inclusion/exclusion review process. It is important to note that this number does not reflect the final total of articles that were analyzed. Re-run searches were completed up to 2018.

3.4.3.4 re-run searches.

Due to the gap in the timeline as to when the review began, there was a need to complete re-run searches for each database up to January 1, 2018. A total of 573 articles were found in all 10 of the main electronic databases. Through the first cut and second cut, using the above

inclusion and exclusion criteria, all but six new articles were eliminated. The final total of articles included within the analysis was 51 (see Appendix D).

3.4.4 charting the data (Stage 4).

Each of the final selected articles was summarized in a table, designed to guide data extraction. The goal of this step was to determine and chart which factors needed to be extracted from each article to help answer the research question (Arksey & O'Malley, 2005; JBI, 2015; Levac et al., 2010). The charting of data was an iterative process in which the data charts were continuously updated to ensure completeness and accuracy (JBI; Levac et al.). This information was documented in a logical and descriptive summary and assisted in identifying key issues and trends within the results. The following categories were used to organize the charts: title and abstract, year of publication, country of study, time of study completion, study objective, methodology used, measures used, on site or virtual, data analysis, key findings, and authors' conclusions. Additionally, a review was conducted for implications to policy and practice, types of ICTs used, types of interventions used, demographics, reason for exclusion from study, empowerment definition used, empowerment as a consideration for the study design, measures of empowerment, social determinants of health present and described in the study, and use of theoretical frameworks.

3.4.5 collating, summarizing, and reporting the results (Stage 5).

The final step required of Arksey and O'Malley's (2005) scoping review framework was to collate and summarize the results for presentation and discussion. The presentation of the results provided a map of the extracted data in a format that aligns with the objectives of the review (Arksey & O'Malley; JBI, 2015). The data was mapped first using a tabular presentation of the main conceptual categories of the results, such as study characteristics, use/impacts of

ICTs on women's empowerment, other key findings, and gaps in research. Figures 4.1 and 4.2 also show the results of studies by year, and country of origin, followed by a narrative summary describing how the results related to the research question and objectives of the review. Secondly, word clouds (see Figures 4.4 and 4.6) were also used to display selected, concise, and visual aspects of the findings.

3.4.6 consultation. (Stage 6).

This step was not considered mandatory in the Arksey and O'Malley (2005) scoping review framework and was discussed with the Student Advisory Committee. The decision was made not to perform this stage due to the short timeline and defined scope of this study. Suggested stakeholders that could have positively contributed to this research included authors of the resulting articles; this step could provide additional insight into the voices of women in terms of qualitative data that may have not been included in the published study.

3.5 Rigour and Study Limitations

Transparency and reproducibility were key considerations in undertaking this scoping review (Arksey & O'Malley, 2005; Levac et al., 2010; JBI, 2015). To ensure transparency, documentation was meticulous throughout the search and review process. A journal was used to document, on a consistent basis, all decisions and rationales for search term choices, as well as both article removal and inclusion (see Appendix E). The independent reviewer assessed all decisions to add or remove an article from the final review. As per Arksey and O'Malley's framework, inclusion and exclusion criteria as well as search terms were developed before undertaking the search and then modified during the review process. To ensure rigour within the iterative process, decisions regarding inclusion and exclusion criteria were discussed between the master's candidate and the SAC team at the outset of the review (Levac et al., 2010). Levac et al.

also recommended that the team meet at the "start, midpoint, and final stages of the abstract review process to discuss challenges and uncertainties related to study selection" (p. 6). To this end, frequent meetings were held during the abstract review process with the candidate's Committee to review questions or challenges as needed. The independent reviewer appraised all forms, questions, inclusion/exclusion criteria, and provided an independent double check of abstracts and final text articles. Finally, the candidate was able to connect with a key contact from within the JBI, who was considered an expert in the scoping review methodology. This person was contacted several times throughout the research process, as an additional resource, to clarify questions and to ensure alignment with the scoping review processes.

While scoping reviews provide an idea as to the breadth of evidence available on a topic, they do not factor in the depth or quality of that evidence (Arksey & O'Malley, 2005; Armstrong et al., 2011; JBI, 2015; Levac et al., 2010). Some authors have argued that scoping reviews should include an assessment of quality; however, Armstrong et al. (2011) contend that this decision should depend on the resources available for the review as well as the purpose of the scoping review itself. The quantity of data that is generated in a scoping review can be significant and so it is important to find a balance between providing an overview of all types of evidence found and providing detailed data and assessment of a smaller number of studies (Arksey & O'Malley). Scoping studies also lack a thorough evaluation of the quality of results, instead producing a narrative account of all available data (Arksey & O'Malley; JBI). This approach serves to ensure that all resulting data is included in the review and does not limit the end number of articles, as in a systematic review. Lastly, to ensure the feasibility of the study and to keep with attainable timelines, the publication timeframe must be restricted.

Chapter 4 Findings

The findings of the scoping review are organized and presented within this chapter as seven sections: (a) studies characteristics and demographics; (b) studies objectives, designs, and theoretical frameworks; (c) definition and attributes of empowerment; (d) ICT interventions to support women's capacity and tools; (e) achieving empowerment through ICTs, including barriers, facilitators, and outcomes; (f) attaining agency; and (g) consideration of the social determinants of health. For ease of reference, the article citations for the 51 studies included in the scoping review are listed in Appendix F.

4.1 Studies Characteristics and Demographics

4.1.1 Studies characteristics.

Using ICTs to empower women has remained consistent within the evidence with a fairly well distributed number of studies published each year. Figure 4.1 illustrates the frequency of

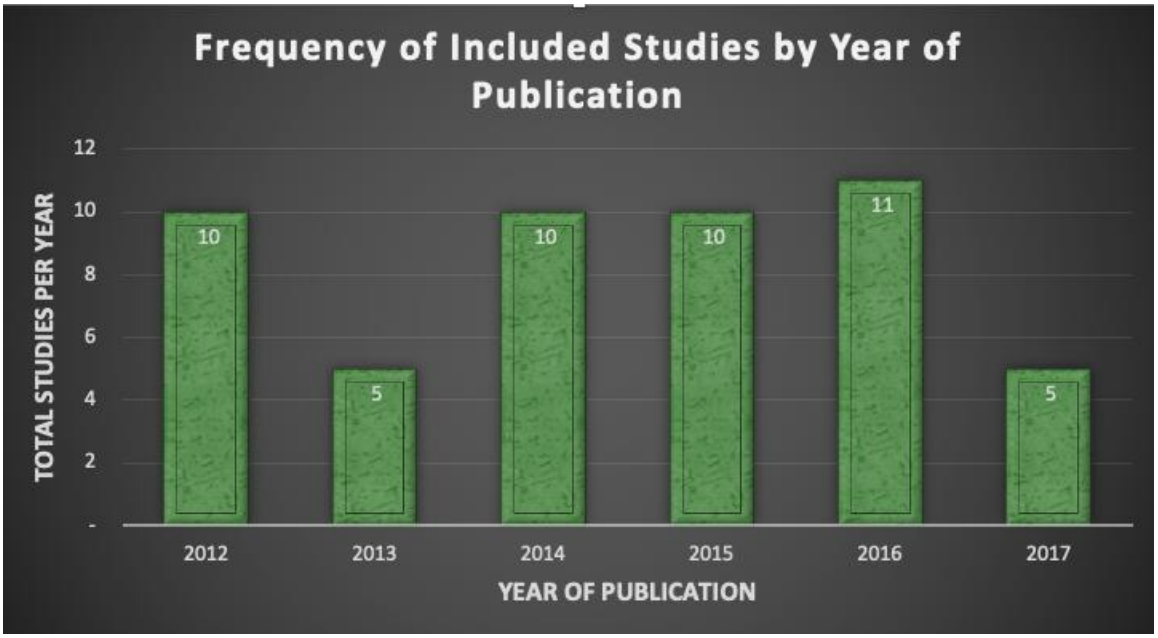


Figure 4-1 *Frequency of Included Studies by Year of Publication*

included studies by year of publication. There is fairly consistent distribution within the publication years. The highest percentage of published studies occurring in 2016 with 21.5%

(11/51). The spread of research studies across years 2012-2017 reflects that this topic of inquiry is not a newly emergent one.

The geographic range of the included evidence was global; however, 41.1% (21/51) described research being conducted in the USA. Seven studies were conducted in India, three in Australia, three in Sweden, and two in Canada. One study was conducted in each of the following countries: Finland, Ghana, Italy, Japan, Nepal, Netherlands, Nigeria, Singapore, South Korea, Sri Lanka, Tanzania, Thailand, Uganda, and United Kingdom. A geo-heat map is provided in Figure 4.2 to illustrate the global spread of countries represented in the results.

Figure 4-2 *Map Depicting Geographical Spread of Study Settings*

The 51 studies were published in 47 journals. Three of the studies were included in the *Journal of Medical Internet Research*, two in the *Feminist Media Studies*, and two in *Telematics and Informatics*. The remaining 44 articles were found in 44 different multidisciplinary journals including women's health, maternal/child health, psychiatry, health promotion, gender studies,

and behavioural studies. This spread confirms that the issue of advancing women's empowerment through ICTs is one of importance across many disciplines, contexts, and populations.

4.1.2 studies demographics.

Seventy eight percent of the articles (40/51) reported on some or all of the descriptive study characteristics. The age of participants was frequently reported though there were inconsistent age groupings across all studies. Some articles only reported the mean age of participants, while others provided only a range of categories. The lowest mean reported was 24 years of age and the highest was 59.6 years of age; the categories ranged from 16 years and under to 64 years and older. It is difficult to compare these as the categories varied and it was unclear as to whether age was simply a descriptive statistic designed to describe the sample or whether it was reflected upon consistently in terms of the overall implications to the study.

Income was less likely to be a collected data element and the categories were reported as inconsistent which make comparisons difficult. Dollar values are only relevant in the North American context and not necessarily as usable or comparable globally.

Education also lacked consistent categories with most researchers having high school or less as a starting point, although some did include 'none' as a grouping. There were various strata applied from primary to post graduate which again make it difficult to compare. In some countries, the educational divisions of primary to secondary are not necessarily congruent with the North American context. The specifics of the studies also influenced how these categories were created and divided; for example, in studies with populations of women who were low-income, with low numeracy and literacy skills, authors either did not cite education as a demographic category or described only the high school category.

Employment was occasionally reported and was again inconsistently categorized, ranging from unpaid to part time to full time, unemployed, or retired. Occasionally, homemaker/ maternity leave and students were mentioned as an employment category.

Overall, it is very difficult to collate and compare demographics as there is a lack of consistency in the reporting of these characteristics. The standardization of groupings for women's empowerment research is important as this might be a positive step for future studies to increase generalizable comparisons and data sharing.

All articles described the demographics of women who were the primary focus of the study. The demographic presentation within the majority of studies was perinatal/pregnant/post-partum populations; these accounted for 21.5% (11/51) of all studies. The second most common demographic was women experiencing disease specific issues in 17.6% of articles (9/51). The profiles of the remaining populations of women within the 51 articles are illustrated in Figure 4.3.

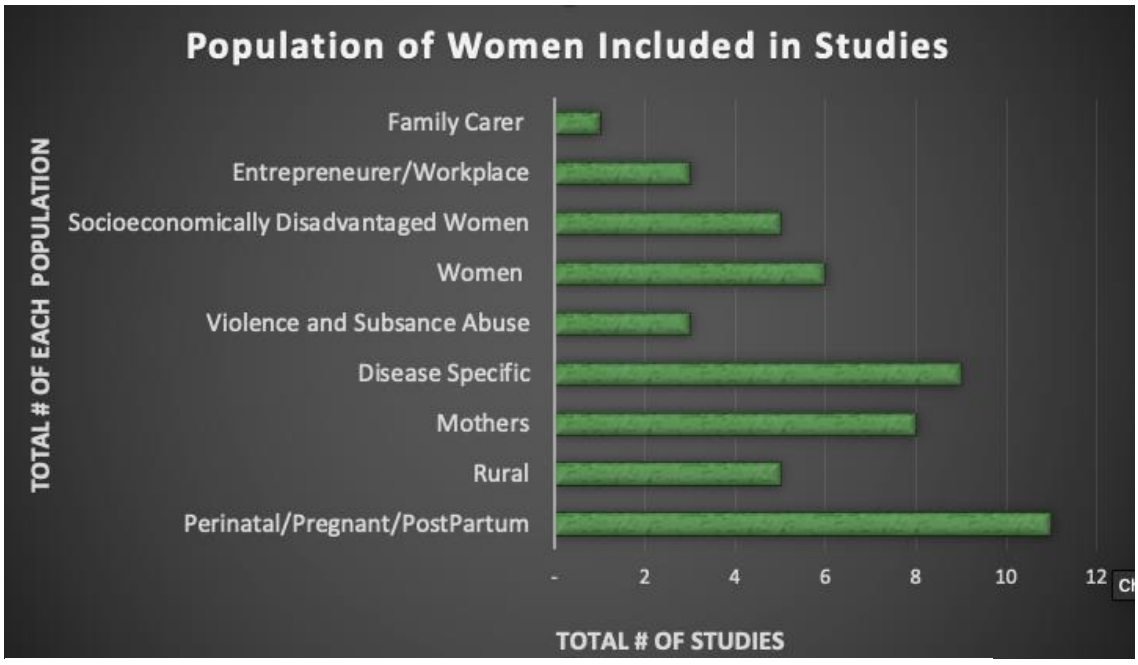


Figure 4-3 *Populations of Women Included in Studies*

4.2 Studies Objectives, Designs and Theoretical Frameworks

This section represents the objectives, designs, and frameworks that were charted and analyzed based on the 51 final included articles.

4.2.1 studies objectives.

The objectives that guided the 51 studies were typically descriptive and exploratory using key words such as "explore," "identify," and/or "understand." Figure 4.4 presents a word cloud created from the content included in the study objectives, aim, or purpose of the included 51 studies. A total of 1,094 words were uploaded into WordArt™ to produce the word cloud. The words within the illustration are sized according to the frequency of which the words appear in the text.

Figure 4-4 *Study Objectives as a Word Cloud (WordArt™)*

4.2.2 research designs.

The majority of the studies, 54% (28/51), used a quantitative research method. A qualitative research method was used for 25% (13/51) of the studies, and mixed methods accounted for 19.6% (10/51). The research studies varied in their size, scope, measures, and

overall number of participants. The variability within the evidence is reflective of the diverse backgrounds and settings through which the advancement of women's empowerment via ICT was being examined. Figure 4.5 illustrates a summary of research designs used.

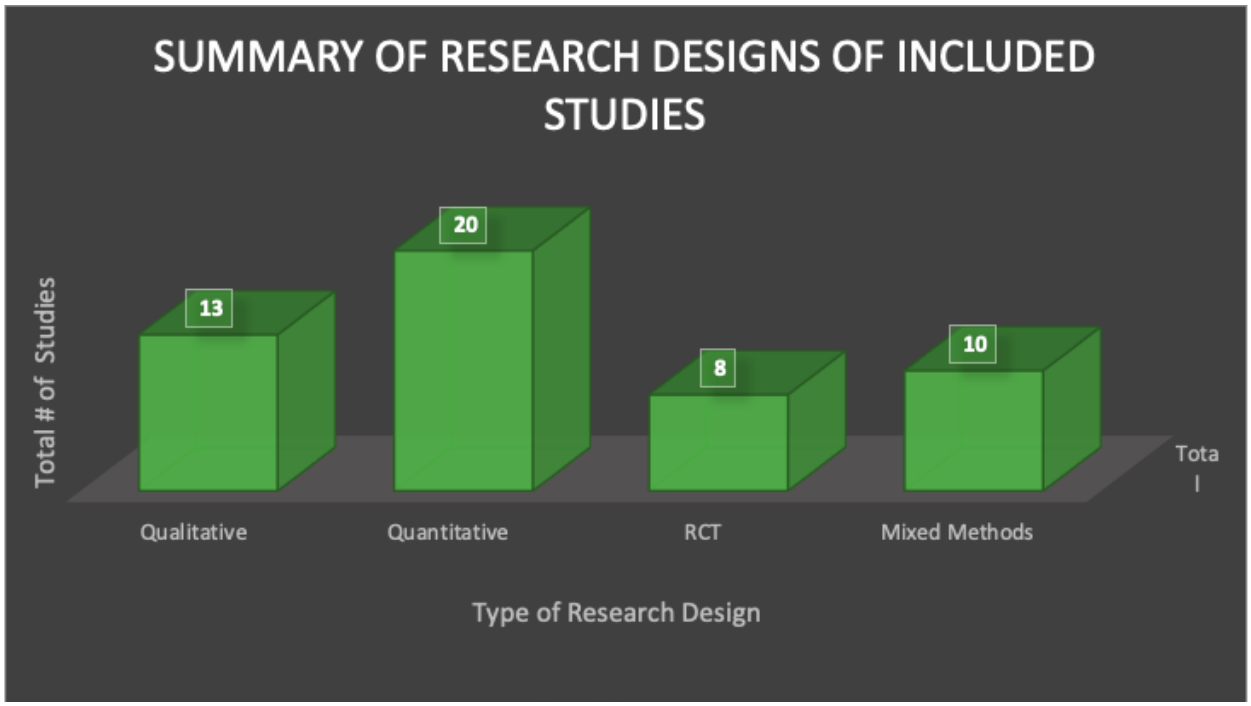


Figure 4-5 *Summary of Research Designs of Included Studies*

4.2.3 theoretical frameworks.

In 56.8% (29/51) of the articles reviewed, there was no theoretical framework stated or used to guide the research and/or the analysis. A total of nine articles utilized a variety of theoretical frameworks with several instances of different authors using the same theory. Five studies cited social cognitive theory (Albright et al., 2012; Choi, Lee, Vittinghoff, & Fukuoka, 2016; Ehlers, Huberty, & de Vreede, 2015; Fjeldsoe, Miller, & Marshall, 2013; Sriramatr, Berry, & Spence, 2014), two utilized the logic model (Hearn, Miller, & Lester, 2014; Mehta & Mehta, 2014), and two studies cited feminist theory (Song, West, Lundy, & Smith Dahmen, 2012; Vivakaran & Maraimalai, 2017). The remaining ten articles included social capital, cognitive behavioural theory, theory of planned behaviour, mattering, self-regulation, health action process

approach, adaptation to illness model, Hofstede's conceptual lens, and cognitive-social heath information processing model.

Three of the 51 articles, all with different authors, applied a framework that focused on empowerment; two used Dutton's Empowerment Model (Choo et al., 2016; Lindsay et al., 2013) while one utilized the Empowering Patient-Education Theory (Siekkinen, Kesänen, Vahlberg, Pyrhönen, & Leino-Kilpi, 2015). Dutton's framework has a specific focus on identifying aspects of life that influenced a woman's vulnerability to intimate partner violence (Choo et al.). Included are perceptions of personal strengths, presence of external resources and social supports beliefs about gender roles and relationships, and positive aspects of current relationships (Choo et al.; Dutton, 1992). Choo et al. utilized this framework as a way to promote empowerment-based interventions that "bolster protective factors against abuse" (p. 197). Such interventions included strengthening women's knowledge about the relationship between their drug use, relationships and safety behaviours, as well as endeavouring to increase social support and self-worth (Choo et al.). Similarly, the empowering patient education theory is based on the premise that knowledge is the foundational element in supporting women on their journey to empowerment (Siekkinen et al.). This theory utilizes a multi-dimensional way of knowing to support the women's personal knowledge regarding self-care, emotions, hospital experiences, social supports, financial supports and resources, and their overall participation in decision making (Siekkinen et al.).

4.2.4 empowerment in study design, outcome, and measures used.

All studies considered the concept of empowerment in their study design; approximately 80% (41/51) of articles considered empowerment as a primary outcome of the study. This was based on the confirmation of synonyms in the search term strategy that were considered to

encompass the concept of empowerment. However, only about 20% (10/51) of the studies that utilized a measurement of empowerment followed this measurement through their study design and potential outcomes (see Table 4.1).

Table 4-1 *Measure of Empowerment*

Measures Related to Empowerment	- Self-efficacy scales to measure ability to overcome barriers (Albright et al., 2012; Fjeldsoe et al., 2013; Kim, Niederdeppe, Graham, Olson, & Gay, 2015; Steffen & Gant, 2016). - Self-reported physical activity, general self-worth, physical self-worth (including perceived physical condition and body attractiveness), physical activity self-efficacy, physical activity self-regulation, physical activity benefits/barriers, and social support for physical activity (Ehlers et al., 2015). - Self-Efficacy for Managing Chronic Disease (SEMCD) scale (Weinert, Cudney, Comstock, & Bansal, 2014). - Self-efficacy child birth scale (Takeuchi & Horiuchi, 2016). - Multidimensional Self-efficacy for Exercise Scale (Sriramatr et al., 2014). - Health self-efficacy was measured using Comprehensive Health Enhancement Support System instrument (Ventura, Sawatzky, Öhlén, Karlsson, & Koinberg, 2017).

4.3 Definition and Attributes of Empowerment

In the included studies, the concept of empowerment was used incongruously with terms like self-concept, self-esteem, and self-worth, sometimes by the same author in the same study, thus it was a challenge to come to a uniform definition for the purposes of this research. Less than one quarter (12/51) of the studies used the term "empower(ment)" in their definition of the concept of interest. These studies defined empowerment as a process but with different foci: as individuals having choice or control over their decisions, as being multi-dimensional and influencing a variety of areas, or with a focus on building individuals' capacity, including internal and external resources.

4.3.1 Empowerment: making choices, taking control, and making decisions.

Within the literature, a number of articles described empowerment as a woman's choice or control over decision making (see Table 4.2).

Table 4-2 *Making Choices, Taking Control, and Making Decisions*

Making Choices	- Increases the capacity of individuals or groups to make choices and to transform those choices into desired actions and outcomes. Central to this process are actions which both build individual and collective assets (Chew, Ilavarasan, & Levy, 2015). - Expands one's freedom of choice and action (Handapangoda & Kumara, 2012). - Builds the capacity of individuals to make a wide range of choices (Handapangoda & Kumara, 2012).
Making Decisions	- Enhances decision making and assists women with having an

	individual voice that builds community (Lindsay et al., 2013; Vivakaran & Maraimalai, 2017). - Operationalizes the utility of the empowerment model which includes (a) protection (via increased understanding of severity/danger in the relationship), (b) enhanced decision making (via identification of priorities and the advantages and disadvantages of safety options), and (c) healing (Lindsay et al., 2013).
Taking Control	- Takes control over [their] prevailing problems (Admiral et al., 2017). - Functions as a continuous process by which powerless people become conscious of their situation, organize collectively to improve it, and access opportunities, with an outcome of which they take control over their own lives, gain skills, and develop self-reliance (Nord, Riggio, & Paliszkiewicz, 2017).

4.3.2 empowerment: holistic and multi-dimensional.

Table 4.3 reflects the literature describing the complexity of the concept of empowerment as holistic and multi-dimensional.

Table 4-3 *Empowerment as Holistic and Multi-dimensional*

Physical and Functional	- Described as biopsychological (i.e. illness, symptoms, treatment, and complications); and functional (i.e. self-care, mobility, rest, and nutrition) (Sarkar, 2016; Siekkinen et al., 2015).

Socio-economic	- Recognizes financial, structural, economical, and social mobility despite their access to information technologies (Sarkar, 2016; Siekkinen et al., 2015). - Promotes entrepreneurial access and success (Vivakaran & Maraimalai, 2017). - Enhances connections when linked with the use of online support groups including: exchanging information, encountering emotional support, finding recognition, sharing experiences, and helping others (Holbrey & Coulson, 2013). - Increases awareness and strengthening of social networks; greater opportunities for socio-economic development (Islam & Slack, 2016).
Experiential and Ethical	- Addresses the experiential, (i.e. emotions and hospital experiences); embeds the ethical, (i.e. rights, duties, and participation in decision-making); and values the social, (i.e. families, other patients, and patient associations) (Sarkar, 2016; Siekkinen et al., 2015).

4.3.3 empowerment: internal versus external capacities.

Describing empowerment as a focus on a woman's capacity, both internal and external, the evidence described the following (see Table 4.4).

Table 4-4 *Empowerment as Internal and External Capacities*

Internal Capacities	- Enhances perceptions of personal strengths, outside resources and social supports, beliefs about relationships and gender roles, and positive aspects of the relationships (Choo et al., 2016). - Increases awareness of positive aspects to relationships (Islam & Slack, 2016). - Improves individual, self-subjective analysis of agency and power in maximizing opportunities and options (Mehta & Mehta, 2014). - Enhances feeling of confidence in the relationship with physician, their treatment, and their social environment; improved acceptance of disease; increase optimism, and enhanced self-esteem and social well-being (Holbrey & Coulson, 2013). - Increases development of individual capacities such as education, skills, and information in order to improve the life chances of individuals and make or empower them to have a better quality of life (Mehta & Mehta, 2014).
External Capacities	- Serves as an outcome to subvert inherent power relationships (Mehta & Mehta, 2014). - Improve opportunities through the participatory approach and provision of ICT tools like mobile phone (Mehta & Mehta, 2014).

Figure 4.6 illustrates a word cloud created from the content that defined empowerment within the 51 articles. A total of 548 words were uploaded into WordArt™ to produce the word

cloud. The words within the illustration are sized according to the frequency of which the words appear in the text.

Figure 4-6 *Empowerment Definition as a Word Cloud (WordArt™)*

The remaining studies described empowerment in a more indirect way, never including the term "empower" or "disempower." Instead, the term empowerment was described via the use of terms that were considered in the search strategy to be synonymous with empowerment. Over half (28/51) described empowerment in terms of barriers to accessing resources and acquiring decision-making control and one fifth (11/51) as the process of enabling a sense of self-efficacy and/or self-worth.

4.3.4 Empowerment: Barriers to resources and decision-making control.

Twenty-eight (28/51) studies described the concept of empowerment as the process of enabling a sense of self-efficacy or self-worth in the ability to overcome barriers to resources, as well as the barriers to decision-making control. As the focus of these studies was on self-efficacy and barriers, both synonyms were identified within the literature and were categorized as a form of empowerment (see Table 4.5).

Table 4-5 *Empowerment as Barriers to Resources and Decision-Making Control*

Barriers to resources (internal and external)	- Improves self-efficacy when making decisions and accessing information that influences health behaviours and self-management of health (Brown et al., 2014; Gold, Normandin, & Boggs, 2016; Hearn et al., 2014; Kim et al., 2014) - Enhances access to information and informed decision making (Åhman, Sarkadi, Lindgren, & Rubertsson; 2016; Chib, Malik, Aricat, & Kadir, 2014; Vogel, Petzel, Cragg, McClellan, Chan, Dickson, & Geller, 2013). - Reinforces connection to health services in the community (Ayiasi et al., 2016). - Enhances health for pregnant women at risk (Jonas et al., 2015). - Renews sense of confidence and positivity (Wollersheim, Koh, Walker, & Liamputtong, 2013). - Increases access to health information, technology and screening (Atlas et al., 2012).
Barriers to decision-making control	- Highlights perception that self-efficacy influences ability to obtain decision making control (Ball, Mouchacca, & Jackson, 2014; Choi et al., 2016; Fjeldsoe et al., 2013). - Posits the ability to take control over health care with reliable information (Akinfaderin-Agarau et al., 2012; Atkinson et al., 2016; Brinkel et al., 2017; Fiander, Ndahani, Mmuya, & Vanneste, 2013; Kukafka et al., 2015; Potnis, 2016; Sjöström et

	al., 2013; Song et al., 2012; Wen et al., 2014). - Details individual perceptions of barriers to choosing a healthy lifestyle (Frizzo-Barker & Chow-White, 2012; Kim, Draska, Hess, Wilson, & Richardson, 2012; Parajuli & Doneys, 2017). - Facilitates access to technology (Bissonnette-Maheux et al., 2015; Tyers, 2012).

4.3.5 Empowerment: Enabling self-efficacy and self-worth.

The following studies (11/51) describe the concept of empowerment as a process to enable self-efficacy and self-worth. As the focus of these studies was on self-efficacy and self-worth, both synonyms were identified within the literature, and were categorized as a form of empowerment (see Table 4.6).

Table 4-6 *Empowerment as Enabling Self-Efficacy and Self-Worth*

Enabling a Sense of Self-Efficacy and/or Self-Worth	- Improves self-efficacy when making decisions and accessing information that influences health behaviours and self-management of health (Albright et al., 2012; Gilbert et al., 2015; Min et al., 2014; Sriramatr et al., 2014; Steffen & Gant, 2016; Takeuchi & Horiuchi, 2016; Weinert et al., 2014; Ventura et al., 2017). - Enhances access to information (Martinez-Brockman, Shebl, Harari, & Perez-Escamilla, 2017). - Improves perceived capability (Kimet al., 2015). - Enhances sense of self-worth (Ehlers et al., 2015).

4.4 ICT Interventions to Support Women's Capacity and Tools

All articles described a variety of supportive ICT interventions. The frequency of specific interventions within the 51 articles can be found in Figure 4.7. These ICT interventions are categorized in subsequent tables as follows: outreach, education, lifestyle, health challenges, prevention, and perceptions of barriers.

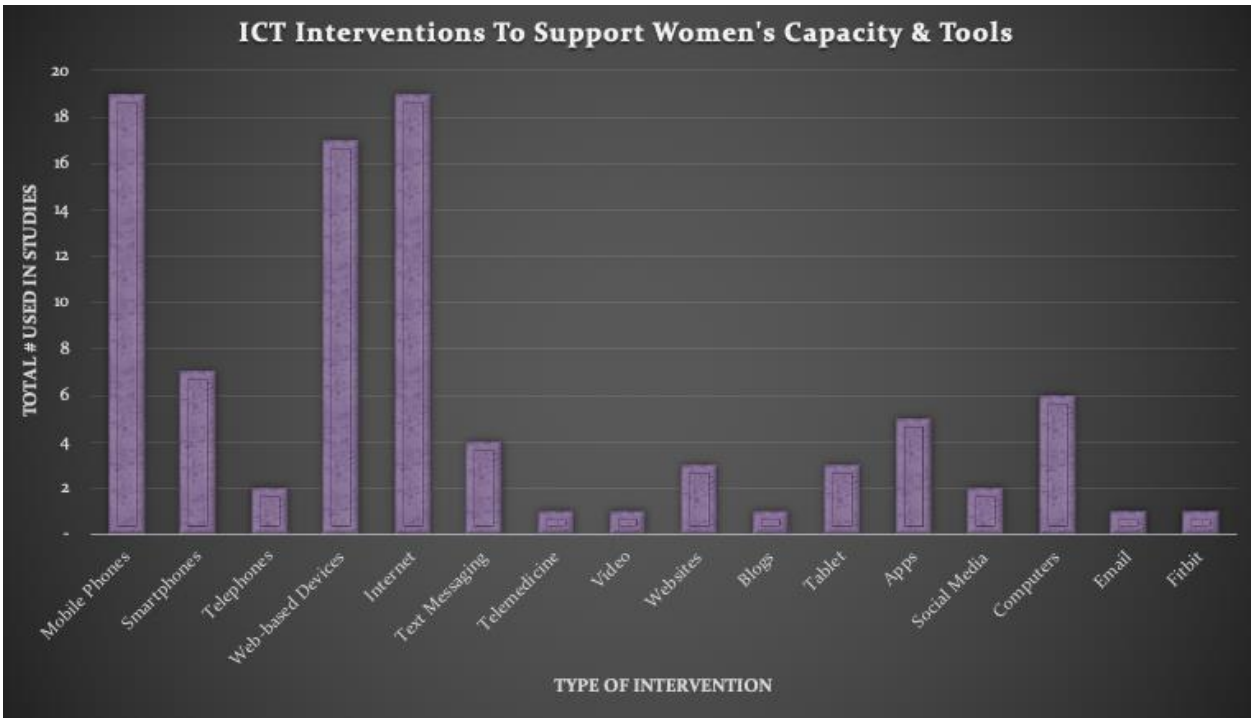


Figure 4-7 *ICT Interventions to Support Women's Capacity and Tools*

4.4.1 Outreach.

Within the literature, a number of articles (10//51) described supportive ICT interventions as a means of outreach or connecting with clients in the community (see Table 4.7). Common themes in this section included supporting women where they are at in the community, in terms of their social position, to enhance positive health behaviours with technological assistance, as well as overall enhanced accessibility to ICTs.

Table 4-7 *ICT Interventions: Outreach*

	- Cognitive Behavioural Therapy via computers (Kim, Hantsoo, Thase, Sammel, & Epperson, 2014). - Web-based decision aid for understanding fetal anomalies (Åhman et al., 2016). - Postpartum smoking relapse prevention using text messaging (Wen et al., 2014). - Physical activity improvements using text messaging (Fjeldsoe et al., 2013). - Coaching for those caring for others using video and phone (Steffen & Gant, 2016). - Physical activity self-reporting using a smartphone app (Min et al., 2014). - Breastfeeding encouragement via educational text messages (Martinez-Brockman et al., 2017). - Health promotion intervention delivery via text blasts (Brown, Hudson, Campbell-Grossman, & Yates, 2014). - Bereavement counselling via internet message forums (Gold, Normandin, & Boggs, 2016). - Pregnancy educational information delivery to women via web-based devices regarding the effect of online self-regulation activities on physical activity (Kim et al., 2015).

4.4.2 Education.

Within the literature, a number of articles (6/51) described supportive ICT interventions that delivered various health information, through smartphones or other web-based devices (see Table 4.8).

Table 4-8 *ICT Interventions: Education*

	- Doctor patient relationships and "examining the role of social class and personal health history in shaping such internet use" (Song et al., 2012). - Antenatal perineal massage (Takeuchi & Horiuchi, 2016). - English language programs (Tyers, 2012). - Facebook™ virtual learning system (Vivakaran & Maraimalai, 2017). - Psychoeducation for breast cancer patients (Admiraal et al., 2017). - Interactive voice response as a tool for improving access to healthcare in remote areas (Brinkel et al., 2017).

4.4.3 General lifestyle.

Within the literature, a number of articles (12/51) described supportive ICT interventions that focused on behavioural outcomes related to general lifestyle areas, using web-based devices (see Table 4.9). Commonly, these interventions provided some form of external support for women to improve their overall way of being healthy.

Table 4-9 *ICT Interventions: General Lifestyle*

	- Improve nutrition knowledge and behaviours (Bissonnette-Maheux et al., 2015). - Promote healthy food planning, shopping, and eating behaviours (Ball et al., 2014). - Deliver intervention for weight loss behaviours (Hearn et al., 2014). - Engage with physical activity coaching (Albright et al., 2012). - Promote healthy physical activity behaviours (Choi et al., 2016; Sriramatr et al., 2014).

	- Combat glucose intolerance with use of pedometer (Kim et al., 2012). - Promote understanding of the role and behaviour of mothering at a distance (Chib et al., 2014). - Provide peer support for building social capital (Wollersheim et al., 2013). - Promote counselling via online support group (Holbrey & Coulson, 2013). - Enhance the success of microentrepreneurs (Chew et al., 2015). - Promote social behaviours via iPad book club (Ehlers et al., 2015).

4.4.4 Health challenges.

A number of articles (11/51) described ICT interventions that focused on using web-based devices to support specific health challenges (see Table 4.10). These health challenges were largely focused on ways to enhance maintenance of women's health, in a variety of ways. The health challenges specified are concentrated on those that affect females versus males.

Table 4-10 *ICT Interventions: Health Challenges*

	- Self-paced education program for those who experience substance abuse and intimate partner violence (Choo et al., 2016; Gilbert et al., 2015). - Education and decision aids for dating violence (Lindsay et al., 2013). - Advanced care planning for women with ovarian cancer (Vogel et al., 2013)

	- Decision aid program for those with a high risk of breast cancer (Kukafka et al., 2015). - Health modules for those with breast cancer (Ventura et al., 2017) - Treatment information for those experiencing stress incontinence (Sjöström et al., 2013). - Educational training for patients with breast cancer (Siekkinen et al., 2015). - Educational training to enhance understanding and management of chronic illness (Weinert et al., 2014). - Money transfer to support transport of patients with fistulas (Fiander et al., 2013). - Electronic health records to improve breast cancer screening (Atlas et al., 2012).

4.4.5 Preventing health challenges.

Within the literature, several articles (3/51) described ICT interventions that focused on preventing specific health challenges using web-based devices (see Table 4.11). This section focused largely on preventing health challenges that are specific to women's issues.

Table 4-11 *ICT Interventions: Preventing Health Challenges*

	- Prevent sexual and reproductive illness using education information (Akinfaderin-Agarau, Chirtau, Ekponimo, & Power, 2012). - Encourage vaccination and immunization with educational information (Atkinson et al., 2016).

	- Prevent pre-eclampsia in rural developing countries using diagnostic tools (Jonas et al., 2015).

4.4.6 Perceptions of barriers.

A number of articles (9/51) described ICT interventions that focused on the perception of barriers to ICTs that assist women in advancing in their understanding and use of ICTs (see Table 4.12).

Table 4-12 *ICT Interventions: Perception of Barriers*

	- Perceived barriers and understanding of the role of mobile phones (Frizzo-Barker & Chow-White, 2012; Mehta & Mehta, 2014). - Awareness of gender-based barriers in telemedicine (Parajuli, & Doneys, 2017). - Development of women via mobile phones (Islam & Slack, 2016; Handapangoda, & Kumara, 2012). - Provision of open access to computers (Sarkar, 2016). - Utilization of social technology, such as Facebook™ and Google™ in the empowerment of women (Nord et al., 2017). - Reveal ideas and attitudes regarding barriers and access (Potnis, 2016). - Connection with women in the community via apps (Ayiasi et al., 2016).

4.5 Achieving Empowerment

4.5.1 Barriers.

Many articles (10/51) described various barriers to using supportive ICTs to empower women. These included community (economic, literacy/usability, other) and individual (economic, information access, connection with others) perceptions (see Table 4.13 and 4.14).

Table 4-13 *Barriers to Empowerment: Community Perceptions*

Economic	- Insurance of transport costs to reach health facility was a barrier to receiving care (Fiander et al., 2013). - Delivery of educational programs via mobile phones present barriers such as cost (Akinfaderin-Agarau et al., 2012). - Mobile literacy skill as a barrier for those living in low-income circumstances but also those women who are unable to be autonomous in their choices due power differentials in the home (Handapangoda & Kumara, 2012).
Literacy/usability	- Adoption of mobile phone use was prevented by usability, in terms of a women's readiness to use technology and accessibility of said technology (Atkinson et al., 2016). - Perceived understanding of how ICTs request socio-demographic information, particularly socio-cultural and individual beliefs as to proper education regarding sexual and reproductive health (Akinfaderin-Agarau et al., 2012).
Other	- Access to mobile phones for those in developing countries including those already living in low-income circumstances;

	for example, a woman's access to the income brought in by her husband, gender norms within the household and society, and competing priorities between autonomous use of technology and household needs (Handapangoda & Kumara, 2012). - Quality of internet and mobile networks was stated as a barrier to use (Akinfaderin-Agarau et al., 2012). - Experience of guilt when using healthy eating blogs regarding the approval or disapproval of key stakeholders in their health status for not complying, such as doctors, friends, family (Bissonnette-Maheux et al., 2015).

Table 4-14 *Barriers to Empowerment: Individual Perceptions*

Economic	- Limits in economic status regarding use of mobile technology including, low household incomes, a lack of financial independence, the general increased cost of owning mobile technology; debts created by husbands that influenced the women's ability to access and spend money (Potnis, 2016). - Restrictions such as low income, poor infrastructure and services, the high cost of the hand set, the high cost of making calls in the absence of a service plan (Mehta & Mehta, 2014).
Information	- Deficits in type and kind of information that is applicable and available (Ball et al., 2014). - Limits in lack of energy and resources as a barrier to using

Connection	mobile technology as a tool for enhancing physical activity (Choi et al., 2016). - Perceptions of mobile technology lacking human interaction and social interaction; lack of training (Brinkel et al., 2017). - Perceptions of negativity in the use of internet message forums; sense of being an outside and not being able to truly connect (Holbrey & Coulson, 2013). - Perceptions of distrust and disconnect from the health care system (Kukafka et al., 2015).

4.5.2 Facilitators.

A number of articles (26/51) described the facilitating factors in using supportive ICTs to empower women. These included community (literacy/usability, access, socioeconomic, self-efficacy) and individual (self-efficacy, socioeconomic, knowledge access, social support) perceptions (see Table 4.15 and 4.16).

Table 4-15 *Facilitating Empowerment: Community Perceptions*

Literacy/usability	- Address low literacy rates by developing text messages for mobile phones that are targeted to this population. Removing complex health terms and non-medical terms, not using long sentences or polysyllabic terms (Wen et al., 2014). - Increase knowledge level and literacy (Siekkinen et al., 2015).
Access	- Increase access to health services, using telemedicine, for those living rurally and also increased time management for household chores and activities (Parajuli & Doneys, 2017).

Socio-economic Self-efficacy	- Provide helpful health information, using credible sources and also provided access to a dietitian that would otherwise not be easy to obtain (Bissonnette-Maheux et al., 2015). - Improve living standards of rural women by providing easier and emergent access to services (Islam & Slack, 2016). - Provide means as cost effective mobile health interventions; address gaps in access and decrease adverse events in resource poor settings (Jonas et al., 2015). - Increase compliance with lifestyle interventions via the use of a mobile self-reporting tool (Min et al., 2014). - Expand social support networks, as well as provide an expansion of their "fun-space." It also served to reduce "information poverty" (Handapangoda & Kumara, 2012). - Increase sense of awareness, importance and reliance on self (Chew et al., 2015).

Table 4-16 *Facilitating Empowerment: Individual Perceptions*

Self- efficacy/ Socioeconomic	- Enhance self-efficacy and goal setting via mobile technology (Fjeldsoe et al., 2013). - Increase optimism and perceived control over the future (Brinkel et al., 2017). - Increase received quality care (Brinkel et al.). - Enhance health education via regular updates and health news

	with disease specific information (Brinkel et al.). - Improve sense of self-efficacy in ability to manage chronic disease; enhance quality of life and increase confidence (Weinert et al., 2014). - Enhance sense of empowerment when connecting and reading about other women's discourse with similar illness; improve sense of support and course of healing (Song et al., 2012). - Enhance ability to manage uncertainties in life (Song et al.). - Engage partner in decision making process; improve access to reliable resources; provide a sense of being able to make a "conscious choice" (Åhman et al., 2016). - Increase physical activity and leisure time; increase self-regulation and ultimately decrease women's resting heart rate (Sriramatr et al., 2014). - Increase self-image and confidence, as well as a readiness to change (Choo et al., 2016). - Increase in physical activity for pregnant women; perceived sense of safety with physical activity (Kim et al., 2015). - Decrease travel restrictions to access care, decrease in cost as well as in general apprehension regarding travelling for health care (Vivakaran & Maraimalai, 2017). - Improve living standards and access to information on income earning with a sense of independence and empowerment. Mobile

Access/Knowledge	technology was also shown to facilitate improvements in the living standards of rural women, which contribute to their personal developments (Islam & Slack, 2016). - Improve sense of financial empowerment (Chib et al., 2014). - Increase in availability of choices (Song et al., 2012). - Enhance ability to connect with others and to access information; increase sense of self-confidence (Holbrey & Coulson, 2013). - Increase sense of self-efficacy and participation as well as a reduction of anxiety (Ventura et al., 2017) - Increased self-image and a boost in confidence (Potnis, 2016). - Enhance access to health information; increase use through email notices and updates on new information (Bissonnette-Maheux et al., 2015). - Improve access and retrieval of information when recommended by trusted health care providers (HCPs). Referral of evidence-based online resources by HCPs was seen as providing a low-cost intervention across most geographic and socioeconomic strata (Hearn et al., 2014). - Improve communication with family and changes with familial relationships for the better. Seen as cost effective (Wollersheim et al., 2013).
Social	- Increase in social status with mobile phone ownership; increase in respect within social network and community (Potnis, 2016).

Support/Connection	- Improve ability to identify intimate partner violence victimization and connect with services; increase in social support and self-efficacy (Gilbert et al., 2015). - Enhance individual space and freedom for housewives with an increase in social circle and mobile literacy (Handapangoda & Kumara, 2012). - Enhance self-efficacy and sense of environmental support (Albright, Steffen, Novotny, Nigg, Wilkens, Saiki, & Brown, 2012). - Improve sense of connection to real people with meaningful support that was important to achieving goals (Choo et al., 2016).

4.5.3 Outcomes.

A number of articles (24/51) described the many outcomes of using supportive ICTs to empower women. These included community (self-efficacy, health promotion, knowledge access) and individual (socioeconomic, knowledge, self-efficacy, health promotion) perceptions (see Table 4.17 and 4.18).

Table 4-17 *Outcomes of Empowerment: Community Perceptions*

Socioeconomic	- Increase positive impact on cultural factors in use of technology including, male dominated cultures, men who control money in the household, collectivistic practices (Potnis, 2016). - Enhance empowerment for success (Nord et al., 2017). - Decrease gender gap in education (Vivakaran & Maraimalai,

Knowledge Access Health Promotion	2017). - Increase in socio-economic status and enhanced knowledge and social network; improvement in education and health of children and society (Mehta & Mehta, 2014). - Improve means to address structural empowerment and access to information; levelling of economic and social hierarchies (Sarkar, 2016). - Enhance empowering knowledge delivered via web (Siekkinen et al., 2015). - Enhance decision making (Åhman et al., 2016). - Enhance prenatal outcomes with technology intervention (Ayiasi et al., 2016). - Increase vaccination rates (Atkinson et al., 2016). - Improve ability in overcoming barriers to health promotion (Brown et al., 2014). - Increase in numbers of rural women who are able to manage chronic illness (Weinert et al., 2014).

Table 4-18 *Outcomes of Empowerment: Individual Perceptions*

Self-efficacy/Connection	- Facilitate acquisition of assets for entrepreneurs (Chew et al., 2015). - Increase in quality of life (Sjöström et al., 2013). - Assist in overcoming language barriers (Tyers, 2012).

Health Promotion	- Increase sense of confidence (Tyers, 2012). - Improve sense of being "always on" when having access to technology; taking a break from ICT was seen as liberating (Frizzo-Barker & Chow-White, 2012). - Improve barrier self-efficacy, goal settings, social support, and an increase in physical activity (Fjeldsoe et al., 2013). - Increase self-efficacy and planning with regards to breast feeding (Martinez-Brockman et al., 2017). - Provide a method of communication and collaboration and network building (Nord et al., 2017). - Increase sense of caregiving self-efficacy as well as a decrease in depressive symptoms (Steffen & Gant, 2016). - Enhance access of care for newborns with use of web-based devices (Ayiasi et al., 2016). - Enhance sense of mothering via distance (Chib et al., 2014). - Provide easier access to screening processes; as a result, women are followed up more easily (Atlas et al., 2012). - Enhance decision making for women with the provision of quality health education information (Vogel et al., 2013). - Increase likelihood of vaccinating on time. Attitudes improved towards immunizations (Atkinson et al., 2016). - Enhance ability to connect to care– most common with concerns regarding onset of labor and fevers in newborns (Ayiasi,

Knowledge Access	Kolsteren, Batwala, Criel, & Orach, 2016). - Improve and reinforce counselling process with text messaging (Martinez-Brockman, Shebl, Harari, & Perez-Escamilla, 2017). - Increase in requests for more digital resources, for those with history of poor access (Tyers, 2012). - Increase accuracy of perceptions of disease (Kukafka, Yi, Xiao, Thomas, Aguirre, Smalletz, & Crew, 2015). - Address privacy of information concerns accessed and shared using web-based devices (Atkinson et al., 2016). - Assess usefulness of app as well as appropriateness, comprehensiveness, and safety (Lindsay, Messing, Thaller, Baldwin, Clough, Bloom, & Glass 2013). - Improve face to face in social support a key comment (Ehlers, Huberty, & de Vreede, 2015). - Enhance ability to provide learning platform and content to women otherwise missing that opportunity (Vivakaran & Maraimalai, 2017).

4.6 Attaining Agency

A number of articles (20/51) described the impact of supportive ICT outcomes on the level of women's empowerment. These are reflected as both potential facilitators for future research and programs, as well as obstacles that were found within the studies. These are outlined in Table 4.19 and 4.20 using community (socioeconomic, health promotion, and collaboration) and individual (socioeconomic, ICT content, ICT strategy) perceptions.

Table 4-19 *Attaining Agency: Community Perceptions*

Socioeconomic	- Importance of recognizing literacy skills; less appealing for those with poor health behaviours to connect with strangers (Akinfaderin-Agarau, Chirtau, Ekponimo, & Power, 2012). - Notion that phones always have positive outcomes; mobile phones can subvert traditional gender norms (Frizzo-Barker & Chow-White, 2012). - Value of informatics to deliver care and transform a change in health care system (Atlas, Ashburner, Chang, Lester, Barry, & Grant, 2012).
Health promotion	- Ability for computer-based program was not enough to influence multi-dimensional outcomes in breastfeeding, however, technology can promote adherence to e-health and supportive interventions (Ventura et al., 2017). - Importance of considering participants' developmental stage; acknowledgement of the ubiquitous use of technology in specific age groups (Lindsay et al., 2013). - Importance to evaluate efficacy of interventions as well as costs and increased community uptake; community involvement and oversight needed to identify at risk women and link them to services (Gilbert et al., 2015). - Personal risks and sense of control using web-based devices as

Collaboration	a means for self-education (Song et al., 2012). - Improved advanced care decision making in acute care settings (Vogel et al., 2013). - Capability of technology as a tool for knowledge translation; importance of addressing attitudes, barriers, and facilitators in developing behavioural changing interventions (Bissonnette-Maheux et al., 2015). - Potential for increase in agency via ICTs in tandem with government policies (Tyers, 2012). - Increase need for accessible and empirically supportive interventions (Steffen & Gant, 2016). - Importance in considering how technology can play a role in the empowerment of women in rural areas if government can provide tax exemption to facilitate better mobile infrastructure (Mehta & Mehta, 2014). - Potential for use in tertiary health care due to high benefit and decreased cost (Jonas et al., 2015).

Table 4-20 *Attaining Agency: Individual Perceptions*

Socioeconomic	- Importance of generational preference – low income minority moms prefer health info via text (Brown et al., 2014). - Use tablet in book club setting has potential to mitigate literacy barriers for women (Ehlers et al., 2015).
ICT Content & Strategy	- Importance of having a wide variation of apps to use (Ball et al.,

	2014). - Importance of tailoring health education to populations for increased participation and positive outcomes (Hearn et. al., 2014; Kim et al., 2014). - Supplement internet intervention with traditional methods (Kim et al., 2012). - Necessary for professional facilitators to ensure online space is safe (Gold et al., 2016). - Importance of focus on goal setting shows potential for behavioral change (Kim et al., 2015). - Consideration of self-assessment tools as a means to increase healthy behaviours (Hearn et al., 2014). - Necessary to follow up on behaviours for disease specific interventions (Takeuchi & Horiuchi, 2016).

4.7 Consideration of the Social Determinants of Health

The presence of the social determinants of health within the study results can be seen in Figure 4.8. As expected, gender was present in each of the 51 articles (100%) with personal health practices and coping being a close second. This finding is supported by the ICT intervention data that is illustrated in the previous section; the majority 88% (45/51) of interventions focused on some aspect of health. Social environments and social support networks were a close third, with 70% (36/51) of studies including this social aspect and following this was education reflecting 66.6% (34/51) articles.

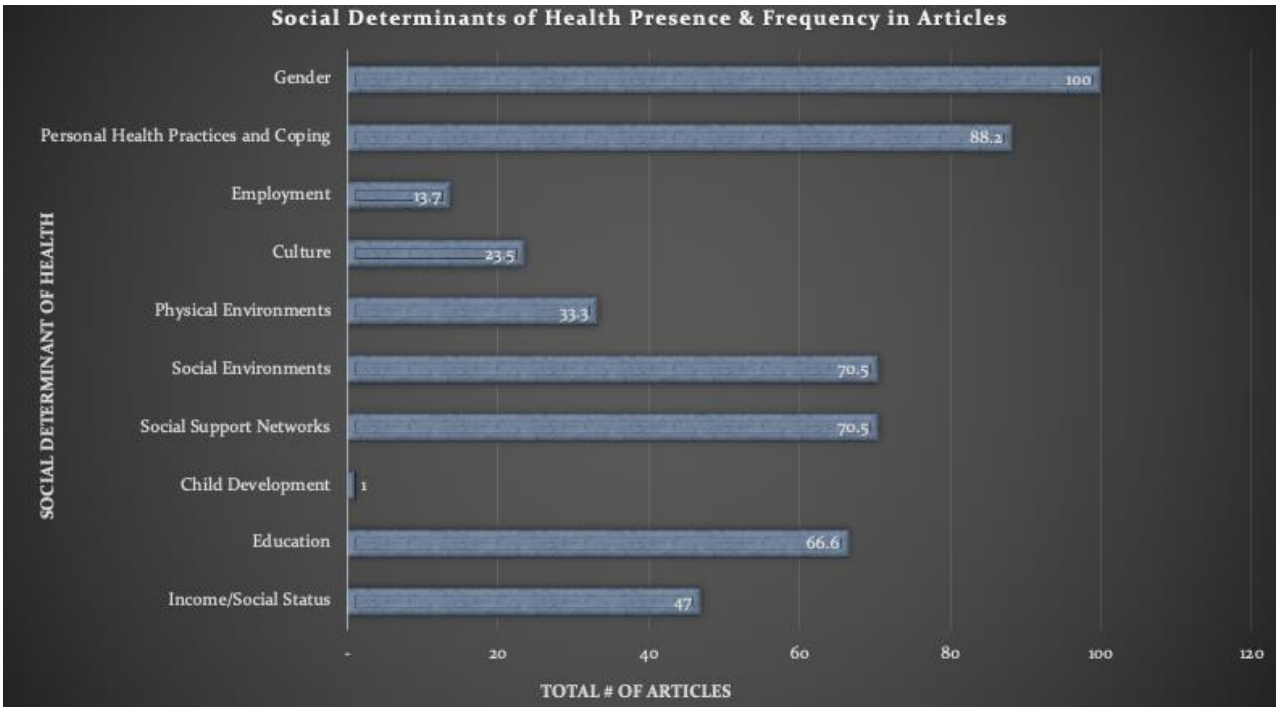


Figure 4-8 *Social Determinants of Health Presence & Frequency in Articles*

Chapter 5 Discussion

5.1 Studies Characteristics, Designs, and Theoretical Frameworks

5.1.1 Studies characteristics.

Given the evolving nature of ICTs and their role in interventions, the articles reflected a recent knowledge base, from 2012-2017. As there were a fairly even distribution of studies published in each year, with 2013 and 2017 being on the lower end, this topic has consistently engaged researchers across many disciplines, contexts, and sectors. The restriction of studies to the English language likely will have influenced the geographic spread.

Analysis of the publication distribution and sources were important considerations for a scoping review. Only three journals appeared more than once (*Journal of Medical Internet Research, Feminist Media Studies,* and *Telematics and Informatics),* with two articles published in each. This distribution speaks to the diversity and breadth of this topic in the literature. Women's empowerment through the use of ICT reaches across a wide variety of disciplines and sectors, such as women's health, maternal/child health, psychiatry, health promotion, gender studies, behavioural studies, and computer science. This distribution also highlighted the challenges with locating relevant and appropriate evidence to support the development of women's empowerment using technologies.

The advancement of women's empowerment through ICT was influenced by many factors such as gender equality, education, economic development, and cultural freedom (Raudeliuniene, Dzemyda, & Kimpah, 2014). In the articles, these factors varied greatly depending on geographic region and it was important to outline the geographic distribution of the study results. The contributing articles reflected an international scope with the majority of studies performed outside of the USA and Canada (55%). As such, the inferences and

conclusions drawn from this data were considered within this global context.

5.1.2 Research designs and empowerment.

The research designs in the articles utilized either quantitative (28/51), qualitative (13/51), or mixed methods (10/51), respectively. All studies considered the concept of empowerment as a key aspect in their study design; however, the majority did not include a measure of empowerment for follow through or outcome evaluation. The majority of studies chose an empirical design, perhaps reflective of the contrasting nature of the subjective concept of empowerment with the objective concept of ICT. The concept of empowerment played an over-arching role in guiding the study design but there was a gap as to how the quantitative studies operationalized this concept and assigned a measured value. This lack of clarity reflected the fairly new and emerging ideas of how empowerment and ICTs merge to support women. Despite the existence of Longwe's (1991) theory on the levels of empowerment, this was not referenced by any of the included studies.

5.1.3 Theoretical frameworks.

Over half of the included studies did not utilize a theoretical framework to guide their research or analysis. Given the complexity and contrast that is inherent between empowerment and ICT, the lack of consensus as to a preferred theoretical framework of focus is reflective of the emergent nature of the research. This has implications in terms of how the evidence will move this emerging body of knowledge forward so as to develop more concrete data, measures, and solutions. All of the studies cited empowerment as a primary focus of the study design; whereas less than 6% (3/51) of those utilized an empowerment-based framework. This absence of a theoretical framework among the majority of studies reflected a lack of depth with regards to the understanding and operationalization of the term empowerment. The common theme among

the remaining range of frameworks was the focus on behavioural change and the development of personal coping strategies with the goal of building the capacity of women and enhancing the control they have over their lifestyle and behaviours. These frameworks supported the general idea of how empowerment was understood within the evidence.

5.2 Defining Empowerment

This section describes the characteristics as to how the term empowerment was defined and discussed within the scoping review studies. Empowerment defined directly or indirectly, by all studies, fell into three major themes: control over decision making, holistic and multi-dimensional in nature, and with a focus on capacity and barriers. Each category is briefly discussed with subsections included to clarify the concepts and ideas.

5.2.1 characteristics of empowerment.

5.2.1.1 control over decision making.

Within this category, the importance of overall needs and voice of the women was focal. Empowerment was understood as the continuous process by which oppressed women become conscious of their individuality and situation, as well as how to organize collectively to improve it, and access opportunities (Nord, Riggio, & Paliszkiewicz, 2017). The outcomes of improvised decision-making included gaining life skills, developing self-reliance, and achieving control over one's life (Nord et al.). Building the capacity of women to make choices, empowered them to have a voice, which helps to build the community around them, which further enhanced their empowerment (Handapangoda & Kumara, 2012; Lindsay et al., 2013; Vivakaran & Maraimalai, 2017). This transformational process supported the development of assets, as well as a freedom of choice and action, for women, both individually and collectively (Chew et al., 2015).

These concepts of building capacity and developing assets were congruent with the Malhotra, Schulte, Patel, and Petesch Pyramid (2009). A shift in perception is needed to address and transform the roots of inequity as well as the limiting and normative beliefs within social and cultural contexts (Cornwall, 2016). Supporting a woman's right to gain access to monetary loans, pursue education, or to choose to obtain a job that supports her family, ultimately impacts the collective character and voice of women within their communities.

The opposing side of having power over decision making is the barrier preventing a woman from taking control. The developing and testing of the search strategy and terms revealed a trend in terms of defining empowerment. It was often defined with a primary focus on disempowerment or barriers and portrayed the assumption that disempowerment is the current and common state of being for women. One way the evidence examined disempowerment was by exploring the existing barriers that prevent women from beginning, continuing, or achieving empowerment. Women faced a wide range of barriers including the inability to take control over health care with reliable information, to choose a healthy lifestyle, to facilitate access to technology, or to own an ICT device. This is reflected within the Malhotra, Schulte, Patel, and Petesch Pyramid (2009) in the understanding that disempowerment and empowerment exist simultaneously and are influenced by the contextual factors of society.

5.2.1.2 holistic and multi-dimensional factors.

The idea that empowerment is a holistic concept and can be viewed within many dimensions of knowing was a theme when reviewing descriptions about the definition of empowerment. Many definitions supported the social determinants of health as root issues in the journey to empowerment. However, to view empowerment holistically, several authors acknowledged the contrasting force of oppression. Thus, it was important to consider the many

factors that influenced these opposing concepts. Empowerment was viewed through a biomedical lens considering health status, access to treatment, and factors that contributed to complications. Likewise, empowerment reflected functional status in terms of ability for self-care, access to nutrition, and the mobility to travel. Financial literacy and financial wellbeing had significant implications for a woman's ability to achieve economic empowerment (Haque & Zulfiqar, 2016; Siekkinen, Kesänen, Vahlberg, Pyrhönen, & Leino-Kilpi, 2015; Sarkar, 2016). Experiential aspects of empowerment and oppression were most crucial to defining the concept. Women are a product of their ethics, beliefs, values, social status, and experiences. These experiential factors influenced capability and opportunity for entrepreneurial access and success (Vivakaran & Maraimalai, 2017), as well as an ability to increase awareness, strengthen social networks, and access opportunities for socio-economic development (Islam & Slack, 2016). The background of contextual factors within the Malhotra, Schulte, Patel, and Petesch Pyramid (2009), one being ICTs, supported the infinite number of factors that could potentially influence oppression and empowerment.

5.2.1.3 focus on capacity.

The articles described individual capacities that included a range of personal resources, both external and internal. External resources included social supports, education, or access to knowledge and information. Internal resources included personal strengths, increased optimism, and enhanced self-esteem. Empowerment came from the personal exploration of agency and power and how these two combined to achieve awareness and freedom of action (Mehta & Mehta, 2014). The process of developing individual capacity had the ultimate goal to improve the life chances of women and empower them to have a better quality of life. The Malhotra, Schulte, Patel, and Petesch Pyramid (2009) described this empowerment through the

development of personal assets, awareness, and ability to access a variety of resources. Authors described a crucial aspect of women's capacity as their sense of perceived strength. This perception was influenced by awareness of positive relationships, interactions, and gender roles as well as power differentials within relationships. Empowerment could not be done to or for someone else (Cornwall, 2016); it is an intrinsic quality that requires transformation and a personal sense of entitlement to be achieved.

The process of achieving capacity was also viewed through the lens of self-efficacy and self-worth development, with the goal to overcome barriers. Generally, self-efficacy was seen as a sense of confidence or optimism and perceived capability to make decisions and access information that positively contributed to the management of health behaviours. Beyond the ability to access information and to improve health behaviours was a sense of self-efficacy enhancing a woman's ability to make informed decisions based on available data and resources in her best interest. Self-efficacy thus enhanced her ability to connect to services within her community, including but not limited to, educational services, maternal/child health services, health screening services, and access to health technology.

5.3 ICT Interventions to Support Women

The following three sub-sections of the discussion align with the levels of the Malhotra, Schulte, Patel, and Petesch Pyramid (2009)**.** These will consider how ICT interventions supported and built a woman's capacity and tools, assisted them in achieving empowerment, and promoted their attainment of agency.

5.3.1 Capacity and tools.

A wide variety of ICT interventions were described in an effort to support women's empowerment. These interventions fell into six categories, (a) outreach; (b) education; (c)

lifestyle; (d) health challenges; (e) prevention; and (f) perceptions of barriers. Rather than discuss each of these individually, this section focuses on the impact of interventions supporting women's empowerment in a broader context. It is acknowledged that additional examination and research of these interventions is required to ensure they remain relevant, current, and appropriate.

The evidence from this review supported the use of ICTs in engaging women within the multi-dimensional rubric of empowerment. The diversity of women, as well as their contexts, must be considered in this effort. The nature of ICT is to connect people with information as well as with each other. The findings section outlined several areas in which ICTs have been used, but this is a very narrow snapshot of its potential and it is by no means exhaustive. Commonly, ICTs have been used to deliver educational content and strategies to a variety of women in a variety of settings. This included pregnancy specific information and virtual Facebook™ learning spaces. The evidence depicted the use of ICT as a way to engage women in cognitive behavioural therapy, encouraged mothers to breastfeed via text message, or provided bereavement counselling via internet message forums. These engagement strategies placed the power and choice back into the hands of women in their homes or at their workplace. Information and communication technologies allowed health care providers to connect with women regarding nutrition, physical activity, cancer self-care specific to women, as well as dating violence strategies using decision aid tools. The use of technologies to support women in their endeavour to seek freedom of action is only limited by society's imagination. It was also utilized in a preventative manner, aligning with upstream strategies for health, for example, using smart phones to educate teenage girls on sexual and reproductive health topics. This intervention focused on the characteristics of a specific population to better support their needs: mobile and

internet based, private, at their discretion for time and space. These interventions provided a solid foundation on which to move forward and develop additional ways of connecting and empowering women. This avenue of intervention widens the field of resources and opportunities that are available to women.

5.3.2 Achieving empowerment.

The achievement of empowerment through the use of ICT is a complex undertaking involving various levels within society. The articles discussed the barriers that prevented the uptake of ICT by individuals and communities as well as the natural and intervening facilitators that supported individuals and communities in the use of ICTs. The evidence reflected the outcomes and future recommendations for both individuals and communities that participate in this endeavour. These themes are organized and grounded in how barriers and facilitators are described for individuals and communities. These themes are reflected through the Malhotra, Schulte, Patel, and Petesch Pyramid (2009) as they consider potential barriers to achieving empowerment with ICTs, as well as the facilitators and the future recommendations that support this goal moving forward.

5.3.2.1 barriers.

When examining the scope of how ICTs are used to support women and their empowerment, the articles considered that using technology at the individual level is not without its challenges. The evidence from this scoping review supports concerns from women regarding the economic implication and consequence of using ICTs. Examples included a lack of financial independence, poor financial circumstances, as well as poor infrastructure to support the kinds of desired technology. Concerns were noted regarding the lack of human interaction that stems from the use of ICTs. Similarly, in the instance of bereavement, some women felt they could not

sift through negative and emotional content on the internet without it affecting their ability to cope or manage their grief. So, while research supported the use of ICTs as a means to connect with women, not all women saw the value in this type of engagement.

From a community perspective, barriers included literacy, accounting for general literacy, as well as health and digital literacies, gender norms of a particular region, and power differentials. In many cases, these issues disproportionately affected women's use of technology and were dependent on those multi-dimensional factors. These barriers are significant in nature and not easily addressed by research teams, program indicators, nurses and nursing teams, or other frontline healthcare professionals. As such, any implementation of ICTs in the attempt to support women must consider the impact of such barriers on use and uptake and plan accordingly.

5.3.2.2 facilitators.

The articles described facilitators to empowerment, using ICTs, that support the enhancement of a woman's capacity. The evidence clearly depicted ICTs as having a positive effect in the pursuit of empowerment. Again, drawing on the multi-dimensional aspect of how empowerment is defined guides how it is operationalized and implemented across different contexts and populations. Information and communication technology as an intervention required a targeted and strategic plan to be executed effectively. Characteristics from the studies regarding interventions that were successful included consideration of specific populations and their context, flexibility in how and when women access ICTs, as well as integrating a follow-up plan to connect with women before, during, and following. Smartphones were particularly successful in facilitating the portability of potential information and in connecting women with supportive programming. This finding could be due to the sense of autonomy that comes with

owning a mobile device and being able to independently and privately access information. This medium of intervention also had the advantage of providing women with a sense of autonomy in their access to ICTs. As such, when considering the impact of ICT, one must also consider the context in which women live and work. Critical reflection was required to choose and implement these technological strategies.

An improved sense of self-efficacy was a common idea that arose from the general use of ICTs. This sense of efficacy played a significant role in how engaged and capable women felt within all life spheres. This sense of confidence influenced women's readiness to change and their sense of control over decision making, for example, the use of a self-management app for chronic disease in which women felt more capable to manage their health and make decisions thereby influencing them in a positive way. Women felt as though this sense of efficacy not only increased their choices in life, but also assisted them with managing uncertainties.

In addition, having access to and being able to fully utilize ICTs provided women with an enhanced sense of family as they were better able to connect with those members that lived further away. This connection provided a sense of support for women as it drastically changed the familial dynamic; where relationships were once strained and distant, ICTs provided a bridge to alleviate that gap. With the use of mobile phones specifically, women also reported a general increase in social status and enhanced sense of community. This, in turn, contributed to mental well-being and quality of life. Another aspect of this sense of community was being able to connect with other women who shared similar illnesses, thereby providing a sense of support and overall enhanced physical and mental healing.

There were also significant economic implications for women who used ICTs. Overall, they experienced an improvement in living standards, as well as an ability to readily access

information related to education, employment, and child health. Subsequently, these improvements lead to an improved quality of life. Women who did not work outside the home were limited in their socio-economic status, whereas ICTs enhanced their individual space and freedom and expanded their social circle. Women, who would otherwise not have the necessary literacy skills nor the opportunity to gain such literacy to utilize mobile phones, found they were able to teach themselves through experience.

This section has briefly discussed the common themes that arose from various ICT interventions. The potential and opportunity to use ICTs as interventions to support women's empowerment is vast. Each year, a variety of technologies are being developed and made available for a diverse set of populations. The populations of women who would benefit from the use of ICTs is limitless; single mothers, single women, those chronically ill, those experiencing mental health challenges, those uneducated, those who experience intimate partner violence, among others. Though it requires critical thought as to which ICT serves women best, the use of ICTs provide a unique opportunity for women to take control of their learning and experiences.

5.3.3 attaining agency.

Agency is perhaps the most challenging for women to attain as it requires a transformational change of societal views and practices. As per the Malhotra, Schulte, Patel, and Petesch Pyramid (2009) that was used to guide this study, discussed in Chapter One, well-being and agency include the ability to make strategic life choices, have self-efficacy, and be empowered by securing freedom and control over resources for self and family. The evidence supported the use of ICT as a means to empower women both individually and collectively but lacked a clear understanding and method to attain the agency that is illustrated within the

Malhotra, Schulte, Patel, and Petesch Pyramid. The current challenge is to consider the evolution and transformation within the individual level of empowerment, in order to achieve agency on a larger societal scale. This imperative means re-focusing on the inequities within the social determinants of health that women face in their daily lives, as well as conceptualizing exactly what steps are required to move up from building one's capacity to attaining agency. The articles described the significance of gender as a determinant of health and the evidence from these studies validates the importance of acknowledging the disparities inherent in other determinants of health and addressing them. The social determinants of health were present within all studies and served as a lens through which to reveal disempowerment. These determinants made the foundation of women's life, work, play, and experience.

The evidence informed potential research strategies on the pathway to agency. A consideration of the importance of generational preference and knowing improved uptake and use of ICTs. Low income and minority women often lacked the funds, transportation, and time to travel for health information, so delivering content via digital messaging was key. This direction supported the development and scaffolding of capacities and resources within the Malhotra, Schulte, Patel, and Petesch Pyramid (2009) and highlighted the importance of this levelling. Engaging with women on the importance of self-awareness and self-assessment through the use of ICTs increased healthy behaviours and outcomes. Another key consideration is developing and implementing ICTs in tandem with government policies that support women to take action in improving their day-to-day lives. Further to addressing the determinants of health, ICTs have the potential to be used as tool for knowledge translation and evaluation in that it can address attitudes, barriers, and facilitators in developing behavioural changing interventions. Key to this being operationalized is the development of a standardized tool for measuring the level of

empowerment experienced by women, as this was lacking within the evidence. Longwe's (1991) suggested levelling of the achievement of empowerment, mentioned in Chapter Two is a suggested tool, theoretical in nature, but lacks a concrete way to operationalize and measure the outcomes of empowerment. Additionally, the development of a dedicated empowerment framework, that supports a measurement tool, would increase the depth of understanding of this issue and provide a more concrete way to address it and move forward.

Well-being is inextricably connected to the complexity of how women live, and this can create challenges in achieving empowerment and agency. It is important to ensure a diverse variety of supports that actually address the root of inequities within the social determinants of health. Thoughtful strategies are needed as to how ICTs can support women to overcome barriers and achieve empowerment. A finding from the evidence suggested that computer-based programs alone are not enough to influence the outcomes in breastfeeding; however, technology can promote adherence to e-health and supportive interventions that women would otherwise not engage in (Ventura, Sawatzky, Öhlén, Karlsson, & Koinberg, 2017).

5.4 Gaps in the Research

In this section, the gaps within the research are discussed. There are prominent commonalities among the included studies in terms of participant demographics as well as how empowerment is defined and measured. The vast majority of women participants were middle class, employed, with an average living income. The sampling overall did not capture those with a lower socio-economic status and who face more barriers to empowerment. The definition and measurement of the concept empowerment, overall, was inconsistent and lacking depth. A discussion of disempowerment and the negative aspects to ICTs were also not found among the final 51 studies. The resulting gaps fell into three categories: (a) the exclusion of certain

demographics; (b) the inconsistency in defining and measuring empowerment; and (c) the disempowerment aspect of ICT.

5.4.1 exclusion of demographics.

Concepts inherent within the topic of empowerment and ICT were accessibility, affordability, and capability. The majority of participants across all 51 studies were Caucasian, employed, making between $40-90,000 per annum, and had at least some secondary education. Furthermore, exclusion criteria for all studies eliminated the participation of women who did not already own a mobile device, computer, or tablet. This result reflects a biased view in terms of demographic populations that are participating in research studies that aim to advance empowerment. Missing from these studies were the perspectives and participation of those women who cannot currently access, and/or afford, and/or who have the capability to purchase an ICT device and then utilize it fully to support their empowerment. The demographic data have significant implications regarding how empowerment is defined and operationalized within the evidence. The Malhotra, Schulte, Patel, and Petesch Pyramid (2009) supports the idea that empowerment and disempowerment occur simultaneously and the literature identified that for one to be empowered one must have experienced oppression. Women who do not have access to or who cannot afford ICTs are disempowered due to a lack of voice and participation within the information society. If these women are not included in the research the capability of measuring the true impact of ICTs on empowerment cannot be adequately assessed. Further research is needed to produce generalizable results that are encompassing of the full spectrum of women across the globe. Research regarding empowerment that continues to be conducted among a generally more advantaged cohort of women does not address the inherent issues of oppression of women within society.

5.4.2 defining empowerment.

The explanation of how empowerment was defined within the evidence has been discussed as being both direct and indirect. Overall, the definition of empowerment was not utilized consistently among the studies, with only 13 including a definition that cited the word "empower." From the outset of the review, it was clear that search terms had to include words beyond simply "empower[ment]" as much of the initial searching revealed many synonyms including, self-efficacy, self-worth, self-concept, and/or capacity. This finding supported the evidence that defines the concept of empowerment as multi-dimensional in nature, as it can potentially mean something different for each woman and her circumstances. Empowerment is a concept that is internal by nature, and as such, can vary in its meaning, as well as in how women ascribe it to themselves. This inconsistency, however, can also imply a lack of consensus on how empowerment is understood. This deficiency has implications in terms of how research studies and interventions are structured and delivered to ensure maximum effectiveness and generalizability.

There were no measures of empowerment cited specifically, beyond the measures of the behaviour being studied such as measures of physical activity, or illness. Several studies, however, included various measures of self-efficacy, for example, child birth, physical activity, intimate partner violence, caregiving, barrier, health, and chronic disease management. A lack of specific measures that can be connected back to the concept of empowerment directly, reflects a barrier, not only in how strategies for empowerment are understood and implemented, but in how researchers will know whether empowerment has been achieved.

5.4.3 disempowerment and ICT.

While none of the studies included in the scoping review indicated the broader negative outcomes related to the use of ICT, the literature supports that there is a flip side to using technology to empower women. The majority of the literature available on the oppression of women using ICT is focused on women's role in science, technology, engineering, and math (STEM) related careers and violence perpetuated via ICTs. With technological advances, cyber abuse, disproportionately affecting women, has become an unfortunate trend (Dimon, Fiesler, & Bruckman, 2011; Henry & Powell, 2018). Forms of cyber abuse include attempts to control a partner, which were cited as most frequent (Bennett et al., 2011; Borrajo, Gamez-Guadix, Pereda et al., 2015; Reed et al., 2016), stalking, harassment, extortion, and bullying (Dimon et al.; Lewis, Rowe, & Wiper, 2016; Pashang, Clarke, Khanlou, & Degendorfer, 2018). Women identified concerns with the ability of ICTs to assist their partner in tracking them using global position system (GPS) technology or whether social media settings were following their activity online (Dimon et al.; Eterovic-Soric, Choo, Ashman, & Mubarak, 2017; Henry & Powell, 2018). Some women felt as though they did not have adequate knowledge to confidently know whether or not this technology was actually being employed (Dimon et al.). This trend in cyber violence calls further attention to the gender inequities and inequalities that exist for women, as well as the significance of gender norms in society.

5.5 Recommendations for Policy and Programs

The following recommendations are based on a synthesis of the research findings and are supported by the key areas of the theoretical framework (see Figure 1.1) as they relate to policy and program development. The three key recommendations for policy and program development are: (a) ensure data collection at local, provincial, and national levels; (b) partner with relevant

stakeholders; and (c) focus on literacy development. The implications of this research for policy makers and program developers could potentially improve women's access and use of ICTs with the goal of promoting empowerment through supportive interventions.

5.5.1 Data collection to inform policy development.

Evidence that women of poor socio-economic status are being eliminated from research studies and programs that claim to support women's empowerment, suggest that access and funding play a large role in policy and program development. Local policies have the greatest potential of improving the uptake of ICTs, as this process occurs initially at the individual level. The theoretical framework supports the use of local resources as one way in which women build their capacity. Policy change needs to begin with a focus on how these resources will address socio-economic and gender issues. Local and national governments need to invest in surveys that inquire how and why women are using technology to support their lives and families. Equally as important is the inquiry of women's perceptions regarding how they prefer to use ICTs to benefit their daily lives or the barriers they experience. A global survey undertaken by the UN Statistics Division in 2011 indicated that only 30 percent of countries regularly produce sex-disaggregated statistics and current data collection does not at all focus on qualitative data collection that would represent the voices of women (UN Statistics Division, 2017). Future data should be translated into gender sensitive policies that support equal access and use of ICTs. The development and implementation of such policies should involve representation of women from all socio-economic backgrounds and ages to ensure in-depth results. Examples include policies that allow women to effectively access and participate within society, the delivery of ICTs at a reasonable cost for all, as well as policies that regulate the cost and provision of services linked to ICTs such as availability of cell phone, easily accessible WiFi sites, and cost-effective internet plans.

5.5.2 Partnerships.

The implications of empowerment through the use of ICT has the potential to cross multiple sectors, both private and public, providing these areas work together. The complexity of empowerment and ICTs as they relate to the root issues of inequities support the need for collaborative involvement across all levels of society. These partnerships should consider the contextual factors that act as facilitators and barriers for women in all types of communities. Interagency partnerships are uniquely suited to develop campaigns or workshops aimed at enabling women to make better use of ICTs. These campaigns should include information on access to education, facilities for education regarding entrepreneurship, employment opportunities, and health and other government health resources. For example, at the international level, there is the Partnership on Measuring ICT for Development. This coalition of policy makers and organizations assists developing countries collect and produce statistics in an effort to identify, inform, and disseminate ICT indicators (ITU, 2019). As of 2019 there are 14 regional and international organizations partnering in this endeavour (ITU). Governments who partner with public and private telecommunication agencies, through subsidization, could provide discounted or refurbished devices for women who are otherwise disadvantaged. Funding would also benefit those who experience difficulty in obtaining mobile devices as well as in accessing programs and workshops aimed at their use. For example, funding is needed to support the cost of transportation to and from workshops, low-cost devices, or the provision of SIM cards. Innovation Canada has a new pilot program, in partnership with private agencies that includes the subsidization of internet for randomly chosen low-income families for a cost of $10/month. The *Connecting Families* initiative is investing $13.2 million over five years to help bridge the gap for those who are challenged to afford home internet access (Innovation Canada,

2018). Alternatively, governments should support and encourage private mobile operators to provide tax exemptions and other benefits to facilitate better mobile services and infrastructure in rural, remote, and urban areas. Providing accessible laptop sites within communities or in schools is another way to bridge the gap in access and use of ICT. These strategies help in improving the overall status of girls and women but also influence overall empowerment and development of the community.

5.5.3 Literacy.

The importance of knowledge regarding deficits in literacy, such as health and digital literacy, and the use of ICTs can inform policies that address gaps in delivery. Literacy skills are a key consideration when developing policies, programs, or other research strategies. As both literacy and digital literacy are issue, especially among women of poor socio-economic status, policies must evolve to recognize that those with access do not necessarily have the capacity to utilize ICTs to their fullest extent. There are 750 million adults world-wide who lack the ability to read, two thirds of whom are women (United Nation Educational Scientific Cultural Organization [UNESCO], 2017). It is important that policies and programs be developed with this in mind; for example, providing adult literacy programs and policies that must include training for digital literacy. Policies created with a thoughtful strategy to address women's empowerment lead the way for programs that meet the needs of specific populations of women. Better informed programs provide a scaffolding of knowledge and skills to women are needed at the local and national level to enable women to fully realize and utilize their mobile phones or other ICTs. It would be beneficial for stakeholders to integrate literacy concerns into their program planning while embedding literacy support throughout all programs. Funding needs to be provided for libraries or other agencies to provide digital literacy programs or workshops that

target women's health, focusing on specific barriers and how to address those using ICTs. For example, two villages in Afghanistan have adopted the Mobile Literacy Programme, which aims at improving the literacy skills of women (UNESCO, 2014). Based on a previous pilot project, it was adopted for the specific challenges that are faced by women in specific villages. Women are provided with a mobile phone to use both inside and outside of the classroom and they receive a combination of technology and literacy education (UNESCO). Program evaluation found that the "use of mobile phones helped to bridge the gap between literacy development in the classroom and its continuous implementation in daily life and communication" (UNESCO, p. 77). The support of government, both locally and nationally, in this endeavour potentiates improved information access, education, as well as opportunities for employment and entrepreneurship.

5.6 Implications for Nursing Education and Practice.

Empowerment is a concept that can be found throughout many nursing curricula and practice environments. A primary aim of nursing is to provide clients with the resources and tools needed to build their capacity so that they reach autonomous self-care in their day-to-day lives. A nursing educator's role is to facilitate the same capacity building in nursing students; delivering the knowledge, skills, and attitudes necessary to provide for clients, families, and communities across all nursing domains, such as practice and education. This research provides clarification and adds a depth of understanding as to how empowerment and ICTs can be fully operationalized among both nursing educators and students, across all practice areas. The implications for educators are two-fold and include: (a) understanding the complexity of empowerment and disseminating this knowledge through strategy development; and (b) collaborating with relevant stakeholders and partners. For students to fully be engaged in the dialogue of empowerment has two implications: (a) increasing awareness of the concept of

empowerment, in partnership with student led organizations; and (b) applying this knowledge in practice environments. Current, comprehensive, and targeted knowledge is needed for nursing education to move forward and to inform nursing educators and nursing students as to how to utilize ICTs as strategy for engaging clients and families.

5.6.1 Nursing educators.

A responsibility of nursing educators is to be aware of new and leading-edge theories, ideas, and strategies and to advocate for their inclusion into education. This can involve attending conferences, keeping up to date on the latest research, and connecting with experts. Educators can disseminate the latest nursing interventions and strategies, and by doing so, inspire nursing students to build capacity among clients, families, and communities. The social determinants of health can be viewed as building blocks within the foundation of how health care professionals understand, assess, and choose to address the health of families and communities. The research findings support the complexity of the concept of both empowerment and ICTs; both in how they are defined and fully operationalized within practice. Supporting women's utilization of and access to ICT is a dynamic and gender sensitive way in which to address the issues of health disparities within communities. Educators have a responsibility to disseminate education about empowerment and should encourage strategies that inform active participation within acute and community practice environments. One strategy could include introducing an online assessment guideline or tool that allows nurses and nursing students alike to assess women's access to technology in relation to their health and their families' health. Ideally, this approach would also include a follow up plan should the initial plan demonstrate a lack of access for the family. It is within these clinical practice spaces that students have the dedicated time and freedom to assess individual and community resources and to develop programs and care plan

strategies that support women. In this regard, educators can provide valuable mentorship to students across all practice areas.

Educators are also in a unique position to collaborate with stakeholders and partners at local, provincial, and national levels. The findings from this research have demonstrated the complexity of empowerment and ICTs, where barriers and facilitators are rooted within the social determinants of health. This collaboration informs strategies that could reduce the barriers that women face in utilizing ICTs. Locally, educators can collaborate with non-profit and for-profit organizations, who work directly with women, by assisting with grant applications and funding that could support the provision of technology and services to women in the community. Partnerships with the local organizations could assist in building capacity within the community and provide guidance on empowerment strategies, specific to the local population. Provincially and nationally, it is important to understand the status of policies and political perspectives related to ICTs and the information society. Part of this is considering and being competent and current with regards to gender sensitive contexts and determinants of health. Educators can participate in national standing committees that have ICTs as a central mission and vision. One example is Canada Health Infoway, whose goal is to integrate technology into the daily lives of Canadians, as a means to support health and give individuals access to their own health information.

Nursing education is the means through which the next generation of nurses gain their competency. Paulo Freire (1970), one of the first to focus on empowerment in-depth stated, "the role of the educator is not simply to transmit knowledge to the student, but to seek alongside [them] the means to transform the world that surrounds [them]" (p. 9). There is no shortage of technology used within nursing; it is used to deliver content, and to communicate, connect and

engage with patients and students. Nursing educators play a key role in shifting the use of ICT from the classroom and into client care settings, especially for women, given the context of this research.

5.6.2 Nursing students.

Strategies and techniques in using ICTs also pertain to nursing students within the classroom and practice environments. The nursing classroom is where students are exposed to the wide variety of concepts, ideas, theories, strategies, and interventions that can be used to support their practice. Students can utilize this research as a way to improve their understanding of the concept of empowerment and how ICTs can facilitate capacity building. This knowledge is supported by various student organizations, for example in Canada, nursing students have the option to belong to the Canadian Nursing Students Association (CNSA). One of the main objectives of the CNSA includes advancing innovation within the nursing profession and curricula (CNSA, 2019). How students connect with each other and within their formal organizations is an important aspect in how knowledge of empowerment strategies can become disseminated, conceptualized and, eventually, operationalized in practice.

Literacy was an important consideration within the findings of this research in terms of being able to fully engage women and enhance their capability to utilize ICTs. Students must ensure their understanding of technology, as well as the implications and resources for how it can improve health outcomes in practice environments. Once there is a consistent understanding and awareness of how to use ICTs, strategies can be developed that translate to client care areas. Such strategies could include students promoting the use of smartphones as a means for teenagers to access health education, both within acute and community settings. Another example could be using existing technological resources within the community to develop new

programming or interventions; for example, using available laptops as a means to provide both recreational times online and also education on specific health topics. Health promotion and education are key aspects of nursing practice and one way in which students can engage and enhance the digital literacy skills of individuals and communities.

5.6.3 Nursing practice.

The findings of this scoping review have several implications related to practice that would contribute to women's empowerment. At the practice level, across all sectors, change concerns primary health providers, as well as those who work within the community setting. This reach among primary health providers has important practice implications in terms of assessment knowledge and techniques that could be utilized to further engage communities. The value in assessing a woman's available technological resources and her capacity to utilize these fully is an important consideration which means assessing what resources she has in her home and/or community and assessing her ability to use resources in a way that supports her freedom of choice and action. Does someone in the home have access to a mobile phone, computer, or tablet? Is the usage of this device limited by anyone? Even with access, does she know how to use the phone in a way that supports her independence? For example, generally knowing how women are using and would use smartphones/apps can impact health professionals' interventions, such as health teaching via smartphone and assisting a woman to download a maternal health app, introducing women to patient portals to increase their engagement with their health, assisting a teenage in downloading and organizing an app that tracks menstrual cycle and provides contraceptive options.

Assessing and acknowledging the barriers faced by women can assist health care providers in tailoring support. Assessment helps HCPs gain a better understanding of a women's

inclinations to change her personal health practices and what may stand in her way. Completing a literacy assessment will inform the plan of care and recommendations for technological intervention. A barrier noted within the evidence related to culture and language. It was found that sometimes those who have access to and own ICT devices, perhaps do not speak English as an additional language. It is important to acknowledge and consider the nuances within those cultural and linguistic differences, as well as household power imbalances, and misconceptions about how technology can be used.

Advocating for change is an important aspect of nursing practice and health care. To actualize changes in policies and practice within the broader health care system, it is important to understand how fluctuations in political structures can impact these endeavours. The conditions in which women live and work are ultimately influenced by laws, economics, and politics. For healthcare policies to be implemented, action is required across local, provincial, and national governmental arenas. According to Oliver (2006), "(s)cience can identify solutions to pressing public health problems, but only politics can turn most of those solutions into reality" (p. 195). Political will carries a large role in funding availability for social programs and this availability can change with the shuffle of political parties from one election to the next.

Reliance on political will to provide sources of funding can impede the progress of effective and necessary policies and programs. These policies and social programs are based on issues that occur in society and are perceived to be objectionable and necessary to change. One avenue which nurses utilize to advocate for healthy public policy is to call attention to issues that affect health and engage politicians and policy makers in a dialogue about concerns (Thurman & Pfitzinger-Lippe, 2017). Governmental responsiveness to a health issue is grounded in the perceived cause, risk, and responsibility for the problem (Oliver, 2006). For example, the

emergence of HIV/AIDS in North America in the 1980s found public perception to be focused on homosexual men and drug users, who were largely cast as deviant (Oliver). As a result of this negative perception and the notion that only these populations were at risk, political sectors delayed assistance in initiating disease surveillance, funding, and research (Oliver). Conversely, a topic that has gained public interest has been the promotion of rights for women and girls. As a response to recommendations made by stakeholders, governments across all levels have invested resources in the pursuit of gender equality. New policies are being implemented across key areas that promote efforts to address sexual and gender-based violence, to advance women's rights, as well as to improve the government's capacity to provide services to women and to build their capacity (Government of Canada, 2018).

Nurses are expected to participate in advocacy within their individual nursing practice and also at the community and societal levels. The concept of social justice is reflected in many professions and disciplines and has been evident within nursing since the days of Florence Nightingale (Thurman & Pfitzinger-Lippe, 2017). It is a complex concept that exists within the foundation of the standards and competencies of nursing practice and health policy (Buettner-Schmidt & Lobo, 2009; Saskatchewan Registered Nurses' Association [SRNA], 2013). Almost every area of nursing is concerned and influenced by the social determinants of health as well as the equitable distribution and access of health resources among individuals and communities. In defining social justice, the Canadian Nurses Association (2009) expanded a clarification of the term resources, which directly links social justice to the determinants of health. In this context, resources imply access to health care services, but also indicate aspects of living that can have a positive effect on health. These can include food security, housing, or employment but also access to technological resources. It is crucial to remain aware of the oppression that exists and

to utilize relevant strategies in an effort to alleviate such injustice, such as advocating for changes to public policy outcomes with and on behalf of groups. This could include nurses becoming involved in politics or activism at the local or national level, volunteering to sit on boards for the local regulatory body or communication organizations or teaching at the post-secondary level. Nurses are not the only professionals who have roles to play in addressing women's issues; it is important that partnerships are formed within and outside the profession to exert greater influence.

The majority of the studies on women and empowerment were researched outside of the discipline of nursing. However, there is value in exploring these concepts and how they can support practice and duty to provide safe, competent, and knowledge-based care (SRNA, 2013). Research into these areas can contribute and add to nursing knowledge of building capacity among women and by extension other groups, such as using smart phones to improve communication and decision making and perhaps bring patients together on blogs or communication forums. Already, the use of technology in healthcare has begun to saturate acute care settings, as well as community and public health settings. This provides nursing with an excellent platform through which to implement health promotion strategies using technological interventions.

5.7 Journaling Process

The candidate maintained a journal throughout the scoping review process. The process of reflective journaling was an important aspect of the overall research process. It enhanced the candidate's understanding and clarity of the concepts and provided a concrete means to view the analysis and connection between them.

Journaling was utilized for two reasons: first, the journal functioned as a way to remain

organized and to document all decisions made by the candidate and/or the team members and provide the rationale for search term choices, track article removal and inclusions, indicate information about databases, and record the number of results. This record keeping was crucial for ensuring the results were organized and that decisions were grounded in evidence and could be later referred to for rationale. The duration of the scoping review process lasted approximately two years and it was important for the candidate to rely on written records to support decisions made about the analysis and synthesis of selected articles. At the end of each stage of the scoping review process the candidate appraised previous entries made within the journal and factor in any relevant ideas, notes, or choices into decisions made moving forward.

Secondly, the journal was used as a reflective tool throughout the research process. At the start of the study, journaling was used to brainstorm ideas regarding the concepts of empowerment and technology. Free form writing, in conjunction with initial literature searches, was utilized to make connections among the concepts and to clarify their meaning in relation to the research. This brainstorming process led to the creation of the initial idea that empowerment and disempowerment existed together and were constantly influenced by contextual factors, such as ICTs. Journaling also provided the candidate a means to reflect on the accuracy and completeness of the search strategy (see Appendix E). Brainstorming, reflection, and support from the librarian encouraged the adding and refining of the search strategy.

5.8 Knowledge Translation

Knowledge translation strategies will include publications in relevant peer reviewed journals such as the *Journal of Community Informatics, Gender, Development and Technology, and Women & Health.* Publications will focus on the practical strategies for engaging women with ICTs both in acute and community settings, as well as the value of using a scoping review

as the methodology. Research results will also be presented at local and national conferences, such as the Annual Women's Leadership and Empowerment conference in 2020, the Canadian Conference on Global Health in 2019, and the Community Health Nurses of Canada conference in 2020. These conferences will provide a unique networking opportunity to disseminate the key findings of this research and also to exchange ideas with experts on the implications for policy and program development. Results will add to the body of knowledge about women's empowerment in North America as well as how ICTs can be better utilized to support and engage women.

5.9 Conclusion

This study focused on the concept of empowerment and how ICTs are being used within the research and by women across the globe in an endeavour to support their lives and health. Using Arksey and O'Malley's (2005) methodological framework for a scoping review, the aim of this study was to explore the breadth of existing evidence, as well as the connections made within the evidence, on the use of ICTs and their impact on women's empowerment across the globe. In keeping with Arksey and O'Malley's methodological framework, this review followed a rigorous and transparent process that included a comprehensive and extensive search of the evidence; beginning with 4481 citations and resulting in 51 studies that were included in the scoping review. Data were extracted and analyzed using a variety of methods and tools and the findings were presented and discussed in Chapters Three, Four, and Five. The results and discussion of this scoping review provided insight into an emerging body of evidence and contributed to the collective understanding of this topic.

Utilizing ICTs as an intervention for empowerment can result in a perceived increase in self-efficacy, improved social networks and socialization, as well as overall enhanced socio-

economic standards of living. The Malhotra, Schulte, Patel, and Petesch Pyramid (2009) used to guide this study aligns with the resulting evidence and findings on empowerment and ICT. Empowerment is considered a process along a continuum and while policies, programs, and technologies can create conditions that are favourable for women to develop the ability for enhanced and strategic decision making, it is ultimately something that must be experienced and achieved alone. The Malhotra, Schulte, Patel, & Petesch Pyramid emphasizes that this journey must begin with awareness and development of internal and external capacities and resources. These capacities and resources are largely informed by the social determinants of health which offers the foundation on which all life choices, opportunities, successes, and eventually empowerment are based.

This review contributes to the global knowledge base on the current status of women's empowerment, how this idea is conceptualized within the evidence, and how a partnership between empowerment and ICTs can further support women's autonomous existence in society. The issue of empowerment and ICTs is one that carries importance across many disciplines, contexts, sectors, populations, and geographical areas. The range of interventions utilized to support empowerment is infinite and there is no limit as to how ICTs can be implemented into daily lives. These findings and discussion provide a foundation on which future research regarding the concept of empowerment with ICTs can move forward. This study is the first of its kind to provide a comprehensive connection and discussion as to how empowerment is currently defined and operationalized, as well as how empowerment and ICTs come together to support women's ability to elevate their experience with oppression to experiencing empowerment.

Goals for women's empowerment at the international level are lacking the broader picture that is told from a gender inclusive perspective. To reach a goal of empowerment first,

the term needs to be consistent, concise, and clear with a partnering framework to support future research and analysis. A comprehensive understanding of how empowerment and ICTs are currently being used to support the complexity of the concepts within society is required. In addition, these concepts need to reinforce and transcend established categories and sectors. These concepts exist within the lives of women across the globe and as such, future research endeavours should aim to understand this broad complexity if this goal is to be achieved. The formation of partnerships and interagency alliances is critically important to approach this issue on the same broad scale as it exists.

There are implications for policy makers, nurses in all domains of practice, and other health care professionals, who work within a variety of settings across the globe. Opportunities exists for further evaluation as to how empowerment is being measured and used in conjunction with ICTs, as well as which frameworks are being used to guide research in this area. This research also provides guidance for HCPs to assist in reducing barriers for women by improving access to ICTs. This includes the assessment and appraisal of women's current and potential resources, awareness of current and relevant ICTs for varying populations as well as the importance of connecting disadvantaged women with ICTs as a resource for health. Information and communication technologies can have a positive impact on women's ability to develop and utilize resources and to ultimately build capacity. As reflected in the Malhotra, Schulte, Patel, & Petesch Pyramid (2009), this ability to access resources and build capacity can improve women's competence to make strategic life choices and to achieve empowerment. The social determinants of health and the concept of social justice are the foundation on which these capabilities are built and can serve as a guideline for nursing practice.

References

Admiraal, J. M., van der Velden, A. W., Geerling, J. I., Burgerhof, J. G., Bouma, G., Walenkamp, A. M., ... & Reyners, A. K. (2017). Web-based tailored psychoeducation for breast cancer patients at the onset of the survivorship phase: A multicenter randomized controlled trial. *Journal of Pain and Symptom Management*, *54*(4), 466-475. doi: 10.1016/j.jpainsymman.2017.07.009

Åhman, A., Sarkadi, A., Lindgren, P., & Rubertsson, C. (2016). "It made you think twice"–an interview study of women's perception of a web-based decision aid concerning screening and diagnostic testing for fetal anomalies. *BMC Pregnancy and Childbirth*, *16*(1), 267. doi: 10.1186/s12884-016-1057-y

Akinfaderin-Agarau, F., Chirtau, M., Ekponimo, S., & Power, S. (2012). Opportunities and limitations for using new media and mobile phones to expand access to sexual and reproductive health information and services for adolescent girls and young women in six Nigerian states. *African Journal of Reproductive Health*, *16*(2), 219-230. doi: 10.4314/ajrh.v16i2.

Albright, C. L., Steffen, A. D., Novotny, R., Nigg, C. R., Wilkens, L. R., Saiki, K., & Brown, W. J. (2012). Baseline results from Hawaii's Nā Mikimiki project: A physical activity intervention tailored to multiethnic postpartum women. *Women & Health*, *52*(3), 265-291. doi:10.1080/03630242.2012.662935

Almerich, G., Orellana, N., Suárez-Rodríguez, J., & Díaz-García, I. (2016). Teachers' information and communication technology competences: A structural approach. *Computers & Education, 100*, 110-125. doi: 10.1016/j.compedu.2016.05.002

Altınay, F., & Altınay, Z. (2018). Women as social entrepreneurship and use of technology.

European Journal of Sustainable Development, *7*(3), 183-190. doi: 10.14207/ejsd.2018.v7n3p183

Alves, E. E. C., & Steiner, A. Q. (2017). Globalization, technology and female empowerment: Breaking rights or connecting opportunities? *Social Indicators Research*, *133*(3), 859-877. doi: 10.1007/s11205-016-1395-1

Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology*, *8*(1), 19-32. Retrieved from http://www.tandfonline.com/DOI/abs/10.1080/1364557032000119616

Armstrong, R., Hall, B. J., Doyle, J., & Waters, E. (2011). Scoping the scope of a Cochrane Review. *Journal of Public Health*, *33*(1), 147-150. Retrieved from http://jpubhealth.oxfordjournals.org/content/33/1/147.short

Atkinson, K. M., Westeinde, J., Ducharme, R., Wilson, S. E., Deeks, S. L., Crowcroft, N., & Wilson, K. (2016). Can mobile technologies improve on-time vaccination? A study piloting maternal use of ImmunizeCA, a Pan-Canadian immunization app. *Human Vaccines & Immunotherapeutics*, *12*(10), 2654-2661. doi: 10.1080/21645515.2016.1194146

Atlas, S. J., Ashburner, J. M., Chang, Y., Lester, W. T., Barry, M. J., & Grant, R. W. (2012). Population-based breast cancer screening in a primary care network. *The American Journal of Managed Care*, *18*(12), 821. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/23286611

Ayiasi, R. M., Kolsteren, P., Batwala, V., Criel, B., & Orach, C. G. (2016). Effect of village health team home visits and mobile phone consultations on maternal and newborn care practices in Masindi and Kiryandongo, Uganda: A community-intervention trial. *PloS*

One, *11*(4), e0153051. doi: 10.1371/journal.pone.0153051

Ball, K., Mouchacca, J., & Jackson, M. (2014). The feasibility and appeal of mobile 'apps' for supporting healthy food purchasing and consumption among socioeconomically disadvantaged women: A pilot study. *Health Promotion Journal of Australia*, *25*(2), 79-82. doi: 10.1071/HE13096

Banda, P. C., Odimegwu, C. O., Ntoimo, L. F., & Muchiri, E. (2016). Women at risk: Gender inequality and maternal health. *Women & Health*, *25*, 1-25. doi: 10.1080/03630242.2016.1170092

Bashshur, R. L., Shannon, G. W., Krupinski, E. A., Grigsby, J., Kvedar, J. C., Weinstein, R. S. (2009). National telemedicine initiatives: Essential to healthcare reform. *Telemedicine Journal E-Health*, 15, 600–610. doi: 10.1089/tmj.2009.9960

Bennett, D. C., Guran, E. L., Ramos, M. C., & Margolin, G. (2011). College students' electronic victimization in friendships and dating relationships: Anticipated distress and associations with risky behaviors. *Violence and Victims, 26*, 410–429. doi:10.1891/0886-6708.26.4.410

Bert, F., Giacometti, M., Gualano, M. R., & Siliquini, R. (2014). Smartphones and health promotion: A review of the evidence. *Journal of Medical Systems*, *38*(1), 9995. doi: 10.1007/s10916-013-9995-7

Bissonnette-Maheux, V., Provencher, V., Lapointe, A., Dugrenier, M., Dumas, A. A., Pluye, P., & Desroches, S. (2015). Exploring women's beliefs and perceptions about healthy eating blogs: A qualitative study. *Journal of Medical Internet Research, 17*(4). doi: 10.2196/jmir.3504

Borrajo, E., Ga´mez-Guadix, M., & Calvete, E. (2015). Cyber dating abuse: Prevalence, context,

and relationship with offline dating aggression. *Psychological Reports, 116,* 565–585. doi: 10.2466/21.16.PR0.116k22w4

Bostock, S., & Steptoe, A. (2012). Association between low functional health literacy and mortality in older adults: Longitudinal cohort study. *British Medical Journal, 344,* e1602. doi: https://DOI.org/10.1136/bmj.e1602

Brimacombe, T., & Skuse, A. (2013). Gender, ICTs, and indicators: Measuring inequality and change. *Gender, Technology and Development*, *17*(2), 131-157. Retrieved from https://www.researchgate.net/publication/269601140_Gender_ICTs_and_Indicators_Measuring_Inequality_and_Change

Brinkel, J., May, J., Krumkamp, R., Lamshöft, M., Kreuels, B., Owusu-Dabo, E., ... & Fobil, J. N. (2017). Mobile phone-based interactive voice response as a tool for improving access to healthcare in remote areas in Ghana: An evaluation of user experiences. *Tropical Medicine & International Health*, *22*(5), 622-630. doi: 10.1111/tmi.12864

Brown, S., Hudson, D. B., Campbell-Grossman, C., & Yates, B. C. (2014). Health promotion text blasts for minority adolescent mothers. *MCN: The American Journal of Maternal/Child Nursing, 39*(6), 357-362. doi: 10.1097/NMC.0000000000000081

Bryant, T., Raphael, D., Schrecker, T., & Labonte, R. (2011). Canada: A land of missed opportunity for addressing social determinants of health. *Health Policy, 101*(1), 44-58. Retrieved from http://www.healthpolicyjrnl.com/article/S0168-8510(10)00256-3/abstract.

Buckingham, D. (2015). Defining digital literacy: What do young people need to know about digital learning. *Digital Kompetanse-Nordic Journal of Digital Literacy, 10*(4). Retrieved from https://www.idunn.no/dk/2015/Jubileumsnummer/defining_digital_literacy_-

_what_do_young_people_need_to_kn

Buettner-Schmidt, K., & Lobo, M. L. (2012). Social justice: A concept analysis. *Journal of Advanced Nursing, 68*(4), 948-958. DOI: 10.1111/j.1365-2648.2011.05856.x

Canadian Institutes of Health Research. (2010). *A guide to knowledge synthesis.* Retrieved from http://www.cihr-irsc.gc.ca/e/41382.html

Canadian Nurses Association. (2009). *Ethics in practice: Social justice in practice.* Retrieved from https://www.cna-aiic.ca/~/media/cna/page-content/pdf-en/ethics_in_practice_april_2009_e.pdf

Center for Disease Control. (2014). Prevalence and characteristics of sexual violence, stalking, and intimate partner violence victimization: National intimate partner and sexual violence survey, United States. (2011). *Morbidity and Mortality Weekly Report.* Retrieved from http://www.cdc.gov/mmwr/preview/mmwrhtml/ss6308a1.htm

Chew, H. E., Ilavarasan, V. P., & Levy, M. R. (2015). Mattering matters: Agency, empowerment, and mobile phone use by female microentrepreneurs. *Information Technology for Development*, *21*(4), 523-542. doi.org/10.1080/02681102.2013.839437

Chib, A., Malik, S., Aricat, R. G., & Kadir, S. Z. (2014). Migrant mothering and mobile phones: Negotiations of transnational identity. *Mobile Media & Communication*, *2*(1), 73-93. doi.org/10.1177/2050157913506007

Choi, J., hyeon Lee, J., Vittinghoff, E., & Fukuoka, Y. (2016). mHealth physical activity intervention: A randomized pilot study in physically inactive pregnant women. *Maternal and Child Health Journal*, *20*(5), 1091-1101. doi: 10.1007/s10995-015-1895-7

Choo, E., Guthrie, K. M., Mello, M., Wetle, T. F., Ranney, M., Tapé, C., & Zlotnick, C. (2016). "I need to hear from women who have 'been there'": Developing a woman-focused

intervention for drug use and partner violence in the emergency department. *Partner Abuse, 7*(2), 193. doi: 10.1891/1946-6560.7.2.193

Chopra, D., & Muller, C. (2016). Connecting perspectives on women's empowerment. *IDS Bulletin, 47*(1A). Retrieved from http://bulletin.ids.ac.uk/idsbo/article/view/1356

Clarke, A. M., Kuosmanen, T., & Barry, M. M. (2015). A systematic review of online youth mental health promotion and prevention interventions. *Journal of Youth and Adolescence, 44*(1), 90-113. doi: 10.1007/s10964-014-0165-0

Colquhoun, H. L., Levac, D., O'Brien, K. K., Straus, S., Tricco, A. C., Perrier, L., & Moher, D. (2014). Scoping reviews: Time for clarity in definition, methods, and reporting. *Journal of Clinical Epidemiology, 67*(12), 1291-1294. Retrieved from http://www.sciencedirect.com /science/article/pii/S0895435614002108

Concannon, F., Flynn, A., & Campbell, M. (2005). What campus-based students think about the quality and benefits of e-learning. *British Journal of Educational Technology, 36*(3), 501-512. doi.org/10.1111/j.1467-8535.2005.00482.x

Cornwall, A. (2016). Women's empowerment: What works? *Journal of International Development, 28*(3), 342-359. DOI.org/10.1002/jid.3210

Cornwall, A., & Rivas, A. M. (2015). From 'gender equality and 'women's empowerment' to global justice: Reclaiming a transformative agenda for gender and development. *Third World Quarterly, 36*, 396–415.

Dalton, J. A., Rodger, D. L., Wilmore, M., Skuse, A. J., Humphreys, S., Flabouris, M., & Clifton, V. L. (2014). "Who's afraid?": Attitudes of midwives to the use of information and communication technologies (ICTs) for delivery of pregnancy-related health information. *Women and Birth, 27*(3), 168-173. doi: 10.1080/01436597.2015.1013341

Davis, K., Drey, N., & Gould, D. (2009). What are scoping studies? A review of the nursing literature. *International Journal of Nursing Studies*, *46*(10), 1386-1400. Retrieved from http://www.sciencedirect.com/science/article/pii/S0020748909000698

Dé, R. (2016). Societal impacts of information and communications technology. *IIMB Management Review*, *28*(2), 111-118. doi.org/10.1016/j.iimb.2016.04.002

Dietrich Leurer, M., Abonyi, S., & Smadu, M. (2013). A syndemic perspective of negative childhood outcomes: Parenting in a "perfect storm" of disadvantaged conditions. *Journal of Poverty*, *17*(2), 198-216. doi.org/10.1080/10875549.2013.775997

Dimond, J. P., Fiesler, C., & Bruckman, A. S. (2011). Domestic violence and information communication technologies. *Interacting with Computers*, *23*(5), 413-421. doi.org/10.1016/j.intcom.2011.04.006

Dixon, L. J., Coorea, T., Straubhaar, J., Covarrubias, L., Graber, D., Spence, J., & Rojas, V. (2014). Gendered spaces: The digital divide between male and female users in internet public access sites. *Journal of Computer-Mediated Communication*, *19*(4), 991-1009. Retrieved from http://onlinelibrary.wiley.com/DOI/10.1111/jcc4.12088/abstract

Doong, S. H., & Ho, S. C. (2012). The impact of ICT development on the global digital divide. *Electronic Commerce Research and Applications*, *11*(5), 518-533. doi>10.1016/j.elerap.2012.02.002

Doss, C. (2014). Collecting sex disaggregated data to improve development policies. *Journal of African Economies*, *23*(1), i62-i86. doi.org/10.1093/jae/ejt023

Drossel, K., Eickelmann, B., & Schulz-Zander, R. (2017). Determinants of teachers' collaborative use of information and communications technology for teaching and learning: A European perspective. *European Educational Research Journal*, *16*(6), 781-

799. doi.org/10.1177/1474904116655811

Dutton, M. A. (1992). Empowering and healing the battered woman: A model for assessment and intervention. New York; Springer Publishing.

Ehlers, D. K., Huberty, J. L., & de Vreede, G. J. (2015). Can an evidence-based book club intervention delivered via a tablet computer improve physical activity in middle-aged women? *Telemedicine and e-Health*, *21*(2), 125-131. doi: 10.1089/tmj.2013.0360

El-Menyar, A., El-Hennawy, H., Al-Thani, H., Asim, M., Abdelrahman, H., Zarour, A., & Latifi, R. (2014). Traumatic injury among females: Does gender matter? *Journal of Trauma Management & Outcomes*, *8*(1), 8. doi.org/10.1186/1752-2897-8-8

Eterovic-Soric, B., Choo, K. K. R., Ashman, H., & Mubarak, S. (2017). Stalking the stalkers–detecting and deterring stalking behaviours using technology: A review. *Computers & Security*, *70*, 278-289. doi.org/10.1016/j.cose.2017.06.008

Eyben, R., & Napier-Moore, R. (2009). Choosing words with care? Shifting meanings of women's empowerment in international development. *Third World Quarterly*, *30*(2), 285-300. Retrieved from http://www.tandfonline.com/DOI/full/10.1080/01436590802681066#.Vzf0pmOqx7Y

Fang, M. L., Canham, S. L., Battersby, L., Sixsmith, J., Wada, M., & Sixsmith, A. (2018). Exploring privilege in the digital divide: Implications for theory, policy, and practice. *The Gerontologist*, *59*(1), e1-e15. doi: 10.1093/geront/gny037

Fiander, A., Ndahani, C., Mmuya, K., & Vanneste, T. (2013). Results from 2011 for the transportMYpatient program for overcoming transport costs among women seeking treatment for obstetric fistula in Tanzania. *International Journal of Gynecology & Obstetrics*, *120*(3), 292-295. doi: 10.1016/j.ijgo.2012.09.026

Fjeldsoe, B. S., Miller, Y. D., & Marshall, A. L. (2013). Social cognitive mediators of the effect of the MobileMums intervention on physical activity. *Health Psychology, 32*(7), 729. doi: 10.1037/a0027548

Freire, P. (1970). *Pedagogy of the Oppressed.* (M. B. Ramos, trans.). New York: Continuum.

Frizzo-Barker, J., & Chow-White, P. A. (2012). "There's an App for That" mediating mobile moms and connected careerists through smartphones and networked individualism. *Feminist Media Studies*, *12*(4), 580-589. doi.org/10.1080/14680777.2012.741876

Gagnon, M., Gagnon, M. P., Ngangue, P., Payne-Gagnon, J., & Desmartis, M. (2015). m-Health adoption by healthcare professionals: A systematic review. *Journal of the American Medical Informatics Association*, *23*(1), 212-220. doi: 10.1093/jamia/ocv052

Gagnon, M. P., Desmartis, M., Labrecque, M., Car, J., Pagliari, C., & Pluye, P. (2012). Systematic review of factors influencing the adoption of information and communication technologies by healthcare professionals. *Journal of Medical Systems*, 36, 241–77. doi: 10.1007/s10916-010-9473-4

Gilbert, L., Shaw, S. A., Goddard-Eckrich, D., Chang, M., Rowe, J., McCrimmon, T., & Epperson, M. (2015). Project WINGS (Women Initiating New Goals of Safety): A randomised controlled trial of a screening, brief intervention and referral to treatment (SBIRT) service to identify and address intimate partner violence victimisation among substance-using women receiving community supervision. *Criminal Behaviour and Mental Health*, *25*(4), 314-329. doi: 10.1002/cbm.1979.

Gill, K., Brooks, K., McDougall, J., Patel, P., & Kes, A. (2010). Bridging the gender divide: How technology can advance women economically. Retrieved from

http://www.icrw.org/files/publications/Bridging-the-Gender-Divide-How-Technology-can-Advance-Women-Economically.pdf

Gold, K. J., Normandin, M. M., & Boggs, M. E. (2016). Are participants in face-to-face and internet support groups the same? Comparison of demographics and depression levels among women bereaved by stillbirth. *Archives of Women's Mental Health, 19*(6), 1073-1078. doi: 10.1007/s00737-016-0657-x.

Golden, S. D., Perreira, K. M., & Durrance, C. P. (2013). Troubled times, troubled relationships: How economic resources, gender beliefs, and neighborhood disadvantage influence intimate partner violence. *Journal of Interpersonal Violence, 28*(10), 2134-2155. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3806630/

Goodman-Deane, J., Mieczakowski, A., Johnson, D., Goldhaber, T., & Clarkson, P. J. (2016). The impact of communication technologies on life and relationship satisfaction. *Computers in Human Behavior, 57*, 219-229. doi.org/10.1016/j.chb.2015.11.053

Government of Canada. (2019). *Canada's feminist international assistance policy*. Retrieved from https://international.gc.ca/world-monde/issues_development-enjeux_developpement/priorities-priorites/policy-politique.aspx?lang=eng

Grabe, S. (2011). An empirical examination of women's empowerment and transformative change in the context of international development. *American Journal of Community Psychology, 49*, 233-245. Retrieved from https://shellygrabe.sites.ucsc.edu/wp-content/uploads/sites/41/2014/10/Grabe-Empowerment-Change-AJCP-2011.pdf

Greaves, L. (2011). Why put gender and sex into health research? In J. L. Oliffe & L. Greaves (Eds.), *Designing and Conducting Gender, Sex and Health Research*, (pp. 3-13). Thousand Oaks: Sage Publications.

Güney-Frahm, I. (2018). A new era for women? Some reflections on blind spots of ICT-based development projects for women's entrepreneurship and empowerment. *Gender, Technology and Development*, *22*(2), 1-15. /doi.org/10.1080/09718524.2018.1506659

Gurumurthy, A. (2004). *Gender and ICTs: Overview report*. Retrieved from http://www.bridge.ids.ac.uk/sites/bridge.ids.ac.uk/files/reports/CEP-ICTs-OR.pdf

Gurumurthy, A. (2006). Promoting gender equality? Some development-related uses of ICTs by women. *Development in Practice, 16*(6). Retrieved from http://www.tandfonline.com/doi/citedby/10.1080/09614520600958298

Hafkin, N. J., & Huyer, S. (2007). Women and gender in ICT statistics and indicators for development. *Information Technologies & International Development*, *4*(2), 25. DOI: 10.1177/0971852413488713

Haji, S. A., Moluayonge, G. E., & Park, I. (2017). Teachers' use of information and communications technology in education: Cameroon secondary schools' perspectives. *Turkish Online Journal of Educational Technology*, *16*(3), 147-153. Retrieved from https://www.researchgate.net/publication/318589136_Teachers%27_Use_of_Information_and_Communications_Technology_in_Education_Cameroon_Secondary_Schools_Perspectives

Haluza, D., & Jungwirth, D. (2015). ICT and the future of health care: Aspects of health promotion. *International Journal of Medical Informatics*, *84*(1), 48-57. doi: 10.1016/j.ijmedinf.2014.09.005.

Handapangoda, W. S., & Sisira Kumara, A. (2012). From silence to voice: Examining the empowerment potential of mobile phones to women in Sri Lanka: The case of dependent

housewives. Retrieved from https://mpra.ub.uni-muenchen.de/41768/

Haque, A., & Zulfiqar, M. (2016). Women's economic empowerment through financial literacy, financial attitude and financial wellbeing. *International Journal of Business and Social Science 7*(3), 78-88. Retrieved from https://ijbssnet.com/journals/Vol_7_No_3_March_2016/9.pdf

Hearn, L., Miller, M., & Lester, L. (2014). Reaching perinatal women online: The healthy you, healthy baby website and app. *Journal of Obesity, 2014*, 1-9. dx.doi.org/10.1155/2014/573928

Henry, N., & Powell, A. (2018). Technology-facilitated sexual violence: A literature review of empirical research. *Trauma, Violence, & Abuse*, *19*(2), 195-208. doi.org/10.1177/1524838016650189

Higgins, S., & Moseley, D. (2001). Teachers' thinking about information and communications technology and learning: Beliefs and outcomes. *Teacher Development*, *5*(2), 191-210. Retrieved https://www.tandfonline.com/doi/abs/10.1080/13664530100200138

Hilbert, M. (2011). Digital gender divide or technologically empowered women in developing countries? A typical case of lies, damned lies, and statistics. *Women's Studies International Forum*, *34*(6), 479-489. dx.doi.org/10.1016/j.wsif.2011.07.001

Holbrey, S., & Coulson, N. S. (2013). A qualitative investigation of the impact of peer to peer online support for women living with polycystic ovary syndrome. *BMC Women's Health*, *13*(1), 51. doi.org/10.1186/1472-6874-13-51

Hopia, H., Punna, M., Laitinen, T., & Latvala, E. (2015). A patient as a self-manager of their personal data on health and disease with new technology–challenges for nursing education, *Nurse Educator Today, 5*(12), e1-3. doi: 10.1016/j.nedt.2015.08.017

House of Commons. (2017). *Taking action to end violence against young women and girls in Canada.* Retrieved from https://www.ourcommons.ca/DocumentViewer/en/42-1/FEWO/report-7/

Howard, S. K., Ma, J., & Yang, J. (2016). Student rules: Exploring patterns of students' computer-efficacy and engagement with digital technologies in learning. *Computers & Education, 101*, 29-42. doi: 10.1016/j.compedu.2016.05.008

IGI Global Disseminator of Knowledge. (n.d.) Information and communication technology. Retrieved from http://www.igi-global.com/dictionary/information-and-communication-technology-ict/14316.

Innovation Canada. (2018). *Connecting Families.* Retrieved from https://www.ic.gc.ca/eic/site/111.nsf/eng/home

Intel. (2013). *Women and web.* Retrieved from http://www.intel.com/content/dam/www/public/us/ en/documents/pdf/women-and-the-web.pdf

International Telecommunication Union. (2017). ICT facts and figures: 2017. Retrieved from https://www.itu.int/en/ITU-D/Statistics/pages/facts/default.aspx

International Telecommunication Union. (2019). Partnership on measuring ICT for development. Retrieved from https://www.itu.int/en/ITU-D/Statistics/Pages/intlcoop/partnership/default.aspx

Islam, M. K., & Slack, F. (2016, March). Women in rural Bangladesh: Empowered by access to mobile phones. In *Proceedings of the 9th International Conference on Theory and Practice of Electronic Governance* (pp. 75-84). doi.org/10.1145/2910019.2910074

Jane, M., Hagger, M., Foster, J., Ho, S., & Pal, S. (2018). Social media for health promotion and

weight management: A critical debate. *BMC Public Health*, *18*(1), 932. doi: 10.1186/s12889-018-5837-3

Jonas, S. M., Deserno, T. M., Buhimschi, C. S., Makin, J., Choma, M. A., & Buhimschi, I. A. (2015). Smartphone-based diagnostic for preeclampsia: A mHealth solution for administering the Congo Red Dot (CRD) test in settings with limited resources. *Journal of the American Medical Informatics Association*, *23*(1), 166-173. doi:10.1093/jamia/ocv015

Kabeer, N. (1999). Resources, agency, achievements: Reflections on the measurement of women's empowerment. *Development and Change, 30*(43), 435-464. Retrieved from https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2017.pdfhttps://www.utsc.utoronto.ca/~kmacd/IDSC10/Readings/research%20design/empowerment.pdf

Kasemsap, K. (2018). Encouraging digital literacy and ICT competency in the information age. In *Encyclopedia of Information Science and Technology, Fourth Edition* (pp. 2253-2263). IGI Global: Suan Sunandha Rajabhat University, Thailand. Retrieved from https://www.igi-global.com/chapter/encouraging-digital-literacy-and-ict-competency-in-the-information-age/183938

Kim, C., Draska, M., Hess, M. L., Wilson, E. J., & Richardson, C. R. (2012). A web-based pedometer programme in women with a recent history of gestational diabetes. *Diabetic Medicine*, *29*(2), 278-283. doi: 10.1111/j.1464-5491.2011.03415.x.

Kim, D. R., Hantsoo, L., Thase, M. E., Sammel, M., & Epperson, C. N. (2014). Computer-assisted cognitive behavioral therapy for pregnant women with major depressive disorder. *Journal of Women's Health*, *23*(10), 842-848. doi: 10.1089/jwh.2014.4867

Kim, H. K., Niederdeppe, J., Graham, M., Olson, C., & Gay, G. (2015). Effects of online self-regulation activities on physical activity among pregnant and early postpartum women. *Journal of Health Communication*, *20*(10), 1115-1124. doi: 10.1080/10810730.2015.1018639

Koivunen, M., & Saranto, K. (2018). Nursing professionals' experiences of the facilitators and barriers to the use of telehealth applications: A systematic review of qualitative studies. *Scandinavian Journal of Caring Sciences*, *32*(1), 24-44. doi: 10.1111/scs.12445

Kukafka, R., Yi, H., Xiao, T., Thomas, P., Aguirre, A., Smalletz, C., ... & Crew, K. (2015). Why breast cancer risk by the numbers is not enough: Evaluation of a decision aid in multi-ethnic, low-numerate women. *Journal of Medical Internet Research*, *17*(7). doi: 10.2196/jmir.4028

Kularski, C., & Moller, S. (2012). The digital divide as a continuation of traditional systems of inequality. *Sociology*, *5151*, 1-23. Retrieved from http://papers.cmkularski.net/20121214-2699.pdf

Landa, A. H., Szabo, I., Le Brun, L., Owen, I., Fletcher, G., & Hill, M. (2011). An evidence-based approach to scoping reviews. *The Electronic Journal of Information Systems Evaluation*, *10*(4), 173-175. Retrieved from http://martinhill.me.uk/pubs/EvidenceBasedApproachToLitReview.pdf

Lankshear, C., & Knobel, M. (2006). Digital literacy and digital literacies: Policy, pedagogy and research considerations for education. *Nordic Journal of Digital Literacy*, *10*, 8-20. Retrieved from http://everydayliteracies.net/files/digital_kompetence_2006.pdf

Leblanc, H. (2015). Promising practices to prevent violence against women and girls. *Report of the Standing Committee on the Status of Women.* Retrieved from

http://ywcacanada.ca/data/ research_docs/00000356.pdf

Levac, D., Colquhoun, H., & O'Brien, K. K. (2010). Scoping studies: Advancing the methodology. *Implementation Science, 5*(1), 1-9. Retrieved from http://download-redirector.springer.com/ redirect?ddsId=art:10.1186/1748-5908-5-69&originUrl=http://implementationscience. biomedcentral.com/article/10.1186/1748-5908-5-69&contentType=pdf

Lewis, R., Rowe, M., & Wiper, C. (2016). Online abuse of feminists as an emerging form of violence against women and girls. *British Journal of Criminology, 57*(6), 1462-1481. doi.org/10.1093/bjc/azw073

Lindsay, M., Messing, J. T., Thaller, J., Baldwin, A., Clough, A., Bloom, T., ... & Glass, N. (2013). Survivor feedback on a safety decision aid smartphone application for college-age women in abusive relationships. *Journal of Technology in Human Services*, *31*(4), 368-388. doi.org/10.1080/15228835.2013.861784

Lips, H. (2013). The gender pay gap: Challenging the rationalizations. Perceived equity, discrimination, and the limits of human capital models. *Feminist Forum, 68*, 169-185. doi: 10.1007/s11199-012-0165-z

Longwe, S. (1991). Gender awareness: The missing element in the Third World Development Project. In T. Wallace & C. March (Eds.), *Changing Perspectives: Writings on gender and development*. Oxford, UK: Oxfam.

Lyles, C. R., & Sarkar, U. (2015). Health literacy, vulnerable patients, and health information technology use: Where do we go from here? *Journal of General Internal Medicine, 30*(3), 271-272. doi: 10.1007/s11606-014-3166-5

Malhotra, A., Schulte, J., Patel, P., & Petesch, P. (2009). *Innovation for women's empowerment*

and gender equality. Retrieved from http://www.icrw.org/taxonomy/term/7?page=1

Mansell, R. (2010). Technology, innovation, power, and social consequence. In *Emerging Digital Spaces in Contemporary Society* (pp. 13-25). Philip Kalantzis Cope (Ed.). Palgrave Macmillan: UK. Retrieved from http://eprints.lse.ac.uk/28195/1/__lse.ac.uk_storage_ LIBRARY_ Secondary_libfile_shared_repository_Content_Mansell,R_Technology%20innovation_Mansell_Technology%20innovation_2014.pdf

Marmot, M., Allen, J., Bell, R., Bloomer, E., & Goldblatt, P. (2012). WHO European review of social determinants of health and the health divide, *The Lancet, 380*(9846), 1011-1029. doi: 10.1016/S0140-6736(12)61228-8

Martinez-Brockman, J. L., Shebl, F. M., Harari, N., & Perez-Escamilla, R. (2017). An assessment of the social cognitive predictors of exclusive breastfeeding behavior using the Health Action Process Approach. *Social Science & Medicine, 182,* 106-116. doi: 10.1016/j.socscimed. 2017.04.014

Martínez-Pérez, B., de la Torre-Díez, I., López-Coronado, M., Sainz-De-Abajo, B., Robles, M., & García-Gómez, J. M. (2014). Mobile clinical decision support systems and applications: A literature and commercial review. *Journal of Medical Systems*, *38*(1), 4. doi: 10.1007/s10916-013-0004-y

Mays, N., Roberts, E., & Popay, J. (2001). Synthesizing research evidence. In N. Fulop, P. Allen, A. Clarke and N. Black (Eds.), *Studying the Organization and Delivery of Health Services: Research Methods* (pp.188-220). London: Routledge.

McCabe E. (2014). Storytelling and the dissolution of categories. *The International Journal of Technology, Knowledge, and Society: Annual Review*. Retrieved from

https://techandsoc.com/assets/downloads/technology/T14FinalProgram.pdf

Mehta, B. S., & Mehta, N. (2014). ICT and Socio-economic empowerment of rural women: Case of mobile phone in India. *Knowledge Horizons-Economics, 6*(4), 103-112. Retrieved from https://ideas.repec.org/a/khe/journl/v6y2014i4p103-112.html

Middleton, C., Veenhof, B., & Leith, J. (2016). *Intensity of internet use in Canada: Understanding different types of users.* Retrieved from https://www150.statcan.gc.ca/n1/en/pub/ 88f0006x /88f0006x2010002-eng.pdf?st=QT15cGLM

Mikkonen, J., & Raphael, D. (2010). *Social determinants of health: Canadian facts*. Retrieved from http://www.nsgamingfoundation.org/articlesReports/Report_Social_Determinants_of_Health_The_Canadian_Facts.pdf

Min, Y. H., Lee, J. W., Shin, Y., W., Jo, M. W., Sohn, G., Lee, J. H., ... & Yu, J. H. (2014). Daily collection of self-reporting sleep disturbance data via a smartphone app in breast cancer patients receiving chemotherapy: A feasibility study. *Journal of Medical Internet Research*, *16*(5). doi: 10.2196/jmir.3421

Miriam Webster Dictionary. (2018a). *Information.* Retrieved from https://www.merriam-webster.com/dictionary/information

Miriam Webster Dictionary. (2018b). *Communication.* Retrieved from https://www.merriam-webster.com/dictionary/communication

Miriam Webster Dictionary. (2018c). *Technology*. Retrieved from https://www.merriam-webster.com/dictionary/technology

Mosedale, S. (2005). Assessing women's empowerment: Towards a conceptual framework. *Journal of International Development, 17,* 243-257. Retrieved from

http://onlinelibrary.wiley.com/doi/10.1002/jid.1212/abstract

Mosedale, S. (2014). Women's empowerment as a development goal: Taking a feminist standpoint. *Journal of International Development*, *26*(8), 1115-1125. doi.org/10.1002/jid.3050

Moser, D. K., Robinson, S., Biddle, M. J., Pelter, M. M., Nesbitt, T. S., Southard, J., & Dracup, K. (2015). Health literacy predicts morbidity and mortality in rural patients with heart failure. *Journal of Cardiac Failure*, *21*(8), 612-618

Muller, I., Rowsell, A., Stuart, B., Hayter, V., Little, P., Ganahl, K., & Nutbeam, D. (2017). Effects on engagement and health literacy outcomes of web-based materials promoting physical activity in people with diabetes: An international randomized trial. *Journal of Medical Internet Research*, *19*(1). doi: 10.2196/jmir.6601

Narayan, D. (2005). Measuring empowerment: Cross-disciplinary perspectives. Retrieved from http://documents.worldbank.org/curated/en/2005/04/6428774/measuring-empowerment-cross-disciplinary-perspectives

Neter, E., & Brainin, E. (2012). eHealth literacy: Extending the digital divide to the realm of health information. *Journal of Medical Internet Research*, *14*(1), e19. Retrieved from http://www.jmir.org/2012/1/e19/?utm_source=twitterfeed&utm_medium=twitter&utm_campaign=Feed:+Top10Tw1+(Top+10+JMIR+Articles:+Most+Tweeted+(Past+1+month)

Nielsen, S. H., von Hellens, L., & Beekhuyzen, J. (Eds.) (2005). *Proceedings from InSITE: Informing Science & IT Education Conference:* Challenge or chaos: A discourse analysis of women's perceptions of the culture of change in the IT industry. Rockhampton, Australia.

Nilsson, L., & Fagerström, C. (2018). Decision-makers and mediators in a home healthcare digitisation process: Nurses' experiences of implementation and use of a decision support system. *Contemporary Nurse, 54*(4-5), 1-11. DOI: 10.1080/10376178.2018.1507676

Nord, J. H., Riggio, M. T., & Paliszkiewicz, J. (2017). Social and economic development through information and communications technologies: Italy. *Journal of Computer Information Systems, 57*(3), 278-285. doi.org/10.1080/08874417.2016.1213621

Oliver, T. R. (2006). The politics of public health policy. *Annual Review of Public Health, 27,* 195-233. Retrieved from https://www-annualreviewsorg.cyber.usask.ca/ doi/pdf 10.1146/ annurev. publhealth.25.101802.123126

Omachi, T. A., Sarkar, U., Yelin, E. H., Blanc, P. D., & Katz, P. P. (2013). Lower health literacy is associated with poorer health status and outcomes in chronic obstructive pulmonary disease. *Journal of General Internal Medicine*, *28*(1), 74-81. doi: 10.1007/s11606-012-2177-3

Ono, H., & Zavodny, M. (2009). Gender and the internet. *Social Science Quarterly, 84*(1), 111-121. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/1540-6237.t01-1-8401007/abstract

Ottenbreit-Leftwich, A. T., Kopcha, T. J., & Ertmer, P. A. (2018). Information and communication technology dispositional factors and relationship to information and communication technology practices. *Second Handbook of Information Technology in Primary and Secondary Education*, 309-333.

Oxford English Dictionary. (2018). *Information and communications technology*. Retrieved from http://www.oed.com.cyber.usask.ca/view/Entry/90670?rskey=cc7Fbk&result=1#eid1208783580

Pagán, F. J. B., Martínez, J. L., & Máiquez, M. C. C. (2018). Internet use by secondary school students: A digital divide in sustainable societies? *Sustainability, 10*(10), 1-14. doi:10.3390/su10103703.

Parajuli, R., & Doneys, P. (2017). Exploring the role of telemedicine in improving access to healthcare services by women and girls in rural Nepal. *Telematics and Informatics*, *34*(7), 1166-1176. doi.org/10.1016/j.tele.2017.05.006

Pashang, S., Clarke, J., Khanlou, N., & Degendorfer, K. (2018). Redefining cyber sexual violence against emerging young women: Toward conceptual clarity. In *Today's Youth and Mental Health* (pp. 77-97). Switzerland: Springer.

Pinto-Bruno, Á. C., García-Casal, J. A., Csipke, E., Jenaro-Río, C., & Franco-Martín, M. (2017). ICT-based applications to improve social health and social participation in older adults with dementia: A systematic literature review. *Aging & Mental Health*, *21*(1), 58-65. doi: 10.1080/13607863.2016.1262818

Poston, B. (2009). Maslow's hierarchy of needs. *Surgical Technologist, 348*. Retrieved from http://www.ast.org/pdf/308.pdf

Potnis, D. (2016). Culture's consequences: Economic barriers to owning mobile phones experienced by women in India. *Telematics and Informatics, 33*(2), 356-369. dx.doi.org/10.1016/j.tele.2015.09.002

Pretorius, H.W., & de Villiers, C. (2009). An analysis of the international discourse of women in information technology. In *Proceedings of the Annual Conference of the South African Institute of Computer Scientists and Information Technologists* (SAICSIT). Vereeniging, South Africa.

Public Health Agency of Canada. (2012a). Ottawa charter for health promotion: An international conference on health promotion. *Population Health*. Retrieved from http://www.phac-aspc.gc.ca/ph-sp/docs/charter-chartre/index-eng.php

Public Health Agency of Canada. (2012b). Sex, gender and public health. *The Chief Public Health Officer's Report on the State of Public Health in Canada, 2012.* Retrieved from http://www.phac-aspc.gc.ca/cphorsphc-respcacsp/2012/chap-2-eng.php

Public Health Agency of Canada. (2013). What determines health? *Population Health.* Retrieved from http://www.phac-aspc.gc.ca/ph-sp/determinants/index-eng.php

Public Health Agency of Canada. (2014). *About health literacy.* Retrieved from http://www.phac-aspc.gc.ca/cd-mc/hl-ls/index-eng.php#tabs-2

Public Health Agency of Canada. (2016). Women's economic empowerment: Guidance note. *Development Challenges and Priorities.* Retrieved from http://www.international.gc.ca/development-developpement/priorities-priorites/weegn-aefno.aspx?lang=eng

Quan-Haase, A. (2015). *Technology and society: Social networks, power, and inequality*. London: Oxford University Press.

Qureshi, N. A., Kundi, G. M., Qureshi, Q. A., Akhtar, R., & Hussain, L. (2015). An investigation into the adoption and use issues of e-health in public sector hospitals of developing countries. *Mediterranean Journal of Medical Sciences*, *2*(1), 23-26. Retrieved from http://mcmscience.org/journal/index.php/MJMS/article/view/15

Ramsey, N., & McCorduck, P. (2005). Where are the women in information technology? *Report of Literature Search and Interviews Prepared for the National Center for Women & Information Technology*. Retrieved from https://alejandrobarros.com/wp-

content/uploads/old/Where_are_the_Women_in_Information_Technology.pdf

Raphael, D. (Ed.). (2016). *Social determinants of health: Canadian perspectives* (3rd ed). Toronto, ON: Canadian Scholars' Press.

Raudeliuniene, J., Dzemyda, I., & Kimpah, J. (2014). Factors for assessment of women empowerment: Theoretical approach. In *8th International Scientific Conference on Business and Management* (pp. 15-16). Vilnius, Lithuania.

Rogers, E.M. (2003). *Diffusion of innovations* (5 ed.). New York: Free Press.

Rootman, I., & Gordon-El-Bihbety, D. (2008). A vision for a health literate Canada: Report of the expert panel on health literacy. Retrieved from http://www.cpha.ca/uploads/portals/h-l/report_e.pdf

Ross, J., Stevenson, F., Lau, R., & Murray, E. (2015). Exploring the challenges of implementing e-health: A protocol for an update of a systematic review of reviews. *BMJ Open*, *5*(4), e006773. dx.doi.org/10.1136/bmjopen-2014-006773

Rouleau, G., Gagnon, M. P., & Côté, J. (2015). Impacts of information and communication technologies on nursing care: An overview of systematic reviews (protocol). *Systematic Reviews*, *4*(1), 75. doi.org/10.1186/s13643-015-0062-y

Rowsell, J., Morrell, E., & Alvermann, D. E. (2017). Confronting the digital divide: Debunking brave new world discourses. *The Reading Teacher*, *71*(2), 157-165. doi.org/10.1002/trtr.1603

Samman, E., & Santos, M.E. (2009). Agency and empowerment: A review of concepts, indicators and empirical evidence. Retrieved from http://www.ophi.org.uk/wp-content/uploads/OPHI-RP-10a.pdf

Sarkar, S. (2016). Beyond the "digital divide": The "computer girls" of Seelampur. *Feminist*

Media Studies, *16*(6), 968-983. doi.org/10.1080/14680777.2016.1169207

Saskatchewan Registered Nurses' Association. (2013). *Standards and foundation competencies for the practice of registered nurses.* Retrieved from https://srna.org/wp-content/uploads/2017/09/Standards_and_Foundation_2013_06_10_Web.pdf

Scheerder, A., van Deursen, A., & van Dijk, J. (2017). Determinants of internet skills uses and outcomes. A systematic review of the second-and third-level digital divide. *Telematics and Informatics*, *34*(8), 1607-1624. 10.1016/j.tele.2017.07.007

Sedgwick, M., Awosoga, O., & Grigg, L. (2017). The impact of mobile technologies on new graduate nurses' perceived self-efficacy and clinical decision making: A report from a longitudinal study in Western Canada. *Journal of Hospital Administration*, *6*(6), 28. DOI: 10.5430/jha.v6n6p28

Sen, G., & Mukherjee, A. (2013). No empowerment without rights, no rights without politics: Gender-equality, MDGs and the post 2015 development agenda. *Working Paper Series: The Power of Numbers: A Critical Review of MDG Targets for Human Development and Human Rights.* Retrieved from https://cdn2.sph.harvard.edu/wp- content/uploads/sites/5/ 2013/09/SenMukherjeePowerOfNumbers HSPHDRAFT _2013_jg_revisions.pdf

Shade, L. R. (2014). Missing in action: Gender in Canada's digital economy agenda. *Journal of Women in Culture and Society, 39*(4), 887-896. DOI: 10.1086/675542

Sherwood, R. J. (2017). Supporting elearners by increasing digital literacy skills in healthcare educators. *Compass: Journal of Learning and Teaching*, *10*(1). doi.org/10.21100/compass. v10i1.375

Siekkinen, M., Kesänen, J., Vahlberg, T., Pyrhönen, S., & Leino-Kilpi, H. (2015). Randomized, controlled trial of the effect of e-feedback on knowledge about radiotherapy of breast

cancer patients in Finland. *Nursing & Health Sciences*, *17*(1), 97-104. doi: 10.1111/nhs.12175

Singer, M. (1994). AIDS and the health crisis of the U.S. urban poor: The perspective of critical medical anthropology. *Social Science and Medicine*, *39*(7), 931–948. Retrieved from http://www.journals.elsevier.com/social-science-and-medicine/

Singh, K., Bloom, S., & Brodish, P. (2015). Gender equality as a means to improve maternal and child health in Africa. *Health Care for Women International*, *36*(1), 57-69. doi: 10.1080 /07399332.2013.824971

Singh, S. (2017). Bridging the gender digital divide in developing countries. *Journal of Children and Media*, *11*(2), 245-247. doi.org/10.1080/17482798.2017.1305604

Sipilä, K. (2014). Educational use of information and communications technology: Teachers' perspective. *Technology, Pedagogy and Education*, *23*(2), 225-241. doi.org/10.1080/1475939X. 2013.813407

Sjöström, M., Umefjord, G., Stenlund, H., Carlbring, P., Andersson, G., & Samuelsson, E. (2013). Internet-based treatment of stress urinary incontinence: A randomised controlled study with focus on pelvic floor muscle training. *BJU International*, *112*(3), 362-372.

Song, F. W., West, J. E., Lundy, L., & Smith Dahmen, N. (2012). Women, pregnancy and health information online: The making of informed patients and ideal mothers. *Gender & Society*, *26*(5), 773-798. doi: 10.1186/s12884-016-0856-5

Sriramatr, S., Berry, T. R., & Spence, J. C. (2014). An Internet-based intervention for promoting and maintaining physical activity: A randomized controlled trial. *American Journal of Health Behavior*, *38*(3), 430-439. doi: org/10.5993/AJHB.38.3.12.

Statistics Canada. (2009). *Canadian Internet Use Survey.* Retrieved from

https://www150.statcan.gc.ca/n1/daily-quotidien/100510/dq100510a-eng.htm

Statistics Canada. (2014). *Women and men who experience cyberstalking in Canada.* Retrieved from https://www150.statcan.gc.ca/n1/pub/75-006-x/2018001/article/54973-eng.htm

Statistics Canada. (2015a). *Economic well-being*. Retrieved from http://www.statcan.gc.ca/pub/89-503-x/2010001/article/11388-eng.htm#a4

Statistics Canada. (2015b). Intimate partner violence. *Family Violence in Canada: A Statistical Profile, 2011.* Retrieved from http://www.statcan.gc.ca/pub/85-002-x/2013001/article/11805/11805-3-eng.htm

Statistics Canada. (2018a). *The gender wage gap and equal pay day*. Retrieved from https://www150.statcan.gc.ca/n1/pub/89-28-0001/2018001/article/00010-eng.htm

Statistics Canada. (2018b). *Summary – Canadian industry statistics*. Retrieved from https://www.ic.gc.ca/app/scr/app/cis/summary-sommaire/51

Status of Women Canada. (2015). *Women and girls in Canada: Presentation to the social trends, policies and institutions deputy minister's policy committee.* Retrieved from http://ywcacanada.ca/data/research_docs/00000367.pdf

Steffen, A. M., & Gant, J. R. (2016). A telehealth behavioral coaching intervention for neurocognitive disorder family carers. *International Journal of Geriatric Psychiatry*, *31*(2), 195-203. doi: 10.1002/gps.4312

Sultan, N. (2014). Making use of cloud computing for healthcare provision: Opportunities and challenges. *International Journal of Information Management*, *34*(2), 177-184. doi: 10.1016/j.ijinfomgt.2013.12.011

Sundberg, K., Eklöf, A. L., Blomberg, K., Isaksson, A. K., & Wengström, Y. (2015). Feasibility of an interactive ICT-platform for early assessment and management of patient-reported

symptoms during radiotherapy for prostate cancer. *European Journal of Oncology Nursing, 19*(5), 523-528. doi: 10.1016/j.ejon.2015.02.013

Takeuchi, S., & Horiuchi, S. (2016). Randomised controlled trial using smartphone website vs leaflet to support antenatal perineal massage practice for pregnant women. *Women and Birth, 29*(5), 430-435. doi: 10.1016/j.wombi.2016.01.010

Techtarget. (2016). *Information and communication technology – or technologies*. Retrieved from http://searchcio.techtarget.com/definition/ICT-information-and-communications-technology-or-technologies

TechWalla. (n.d.). *The difference between IT and ICT.* Retrieved from https://www.techwalla.com /articles/the-difference-between-it-ict

The Joanna Briggs Institute. (2015). *Methodology for JBI scoping reviews*. Retrieved from http://joannabriggs.org/assets/docs/sumari/Reviewers-Manual_Methodology-for-JBI-Scoping-Reviews_2015_v2.pdf

Thurman, W., & Pfitzinger-Lippe, M. (2017). Returning to the profession's roots. *Advances in Nursing Science, 40*(2), 184-193. doi: 10.1097/ANS.0000000000000140.

Timsina, L. R., Willetts, J. L., Brennan, M. J., Marucci-Wellman, H., Lombardi, D. A., Courtney, T. K., & Verma, S. K. (2017). Circumstances of fall-related injuries by age and gender among community-dwelling adults in the United States. *PLoS one, 12*(5), e0176561. doi: 10.1371/journal.pone.0176561.

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K., Colquhoun, H., Kastner, M., Levac, C., Sharpe, J.P., Wilson, K., Kenny, M., Warren, R., Wilson, C., Stelfox, H.T., & Straus, S. E. (2016). A scoping review on the conduct and reporting of scoping reviews. *BMC Medical Research Methodology, 16*(1), 1. doi: 10.1186/s12874-016-0116-4.

Tyers, A. (2012). A gender digital divide? Women learning English through ICTs in Bangladesh. In *CEUR Workshop Proceedings*: Helsinki, Finland.

United Nation Educational Scientific Cultural Organization. (2017). *Tracking literacy in an increasingly digital world.* Retrieved from http://uis.unesco.org/en/blog/tracking-literacy-increasingly-digital-world-0

United Nations Development Programme. (2018). *Human development indices and indicators.* Retrieved from http://hdr.undp.org/sites/default/files/2018_human_development_statistical_update.pdf

United Nations International Children's Emergency Fund. (2018). *Literacy rates.* Retrieved from https://data.unicef.org/topic/education/literacy/

United Nations Statistics Division. (2015). *The world's women: Trends and statistics*. Retrieved from https://unstats.un.org/unsd/gender/worldswomen.html

United Nations Statistics Division. (2017). *Gender data: Sources, gaps, and measurement opportunities*. Retrieved from http://www.data4sdgs.org/sites/default/files/2017-09/Gender%20Data%20-%20Data4SDGs%20Toolbox%20Module.pdf

United Nations. (2013). *Global study on homicide.* Retrieved from https://www.unodc.org/documents/gsh/pdfs/2014_GLOBAL_HOMICIDE_BOOK_web.pdf?fbclid=IwAR24MpEop7IdnaVK39AzK-GdZJt6gEKoRFhBWIG7vQY_J_KF5sCZa62l3k4

United Nations. (2015). *The millennium development goals report.* Retrieved from http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf

United Nations. (n.d.) *Sustainable Development Goals Report*. Retrieved from

https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

Van Dijk, J. A. (2017). Digital divide: Impact of access. *The International Encyclopedia of Media Effects*, 1-11. Retrieved from https://www.utwente.nl/en/bms /vandijk/publications/ digital_divide_impact_access.pdf

Ventura, F., Sawatzky, R., Öhlén, J., Karlsson, P., & Koinberg, I. (2017). Challenges of evaluating a computer-based educational programme for women diagnosed with early-stage breast cancer: A randomised controlled trial. *European Journal of Cancer Care, 26*(5). doi.org/10.1111 /ecc.1 2534

Vivakaran, M. V., & Maraimalai, N. (2017). Feminist pedagogy and social media: A study on their integration and effectiveness in training budding women entrepreneurs. *Gender and Education*, *29*(7), 869-889. doi.org/10.1080/09540253.2016.1225008

Vogel, R. I., Petzel, S. V., Cragg, J., McClellan, M., Chan, D., Dickson, E., & Geller, M. A. (2013). Development and pilot of an advance care planning website for women with ovarian cancer: A randomized controlled trial. *Gynecologic Oncology, 131*(2), 430-436. doi: 10.1016/j. ygyno.2013.08.017.

Wahlin, I. (2017). Empowerment in critical care: A concept analysis. *Scandinavian Journal of Caring Sciences, 31*(1), 164-174. doi.org/10.1111/scs.12331

Walker, L. O., & Avant, K. C. (2011). *Strategies for theory construction in nursing* (5th ed.). Norwalk, CT: Appleton & Lange.

Wanner, T., & Palmer, E. (2015). Personalising learning: Exploring student and teacher perceptions about flexible learning and assessment in a flipped university. *Computers and Education, 88*, 354-369. doi:10.1016/j.compedu.2015.07.008

Wasserman, I. M., & Richmond-Abbott, M. R. (2005). Gender and the internet: Causes of variation in access, level, and scope of use. *Social Science Quarterly, 86*(1), 252-270. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.0038-4941.2005.00301.x/abstract;jsessionid=3ECF5CC65545D150D4AF23829FEA18A6.f02t02

Weinert, C., Cudney, S., Comstock, B., & Bansal, A. (2014). Computer intervention: Illness self-management/quality of life of rural women. *Canadian Journal of Nursing Research*, *46*(1), 26-43. doi: 10.1177/084456211404600104

Weiss, M., & Tarchinskaya, E. (2015). The role of information technologies in changing the status of women to improve human conditions. In J. V. Brocke, A. Stein, S. Hofmann, S. Tumbas (Eds.) *Grand Societal Challenges in Information Systems Research and Education* (pp. 51-60). New York: Springer International.

Wen, K. Y., Miller, S. M., Kilby, L., Fleisher, L., Belton, T. D., Roy, G., & Hernandez, E. (2014). Preventing postpartum smoking relapse among inner city women: Development of a theory-based and evidence-guided text messaging intervention. *JMIR Research Protocols*, *3*(2). doi: 10.2196/resprot.3059.

Wollersheim, D., Koh, L., Walker, R., & Liamputtong, P. (2013). Constant connections: Piloting a mobile phone-based peer support program for Nuer (southern Sudanese) women. *Australian Journal of Primary Health*, *19*(1), 7-13. doi: 10.1071/PY11052.

Women Like Us Foundation. (2018). *Gender equity and equality*. Retrieved from https://www.womenlikeusfoundation.org/the-latest/2018/7/4/the-difference-between-gender-equity-and-gender-equality

World Economic Forum. (2017). *The Global Gender Gap Report.* Retrieved from

http://www3.weforum.org/docs/WEF_GGGR_2017.pdf

World Health Organization. (2016). *E-Health*. Retrieved from http://www.who.int/trade/glossary/story021/en/

World Health Organization. (2017). *Violence against women.* Retrieved from https://www.who.int/news-room/fact-sheets/detail/violence-against-women

World Health Organization. (2018). *Health Promotion*. Retrieved from http://www.who.int/healthpromotion /conferences/7gchp/track1/en/

World Internet Project. (2009). *International Report 2009*. Retrieved from http://www.digitalcenter.org/wp-content/uploads/2013/02/WIP-report-2009-final.pdf

World Summit on Information Society. (2015). *High Level Policy Statements*. Retrieved from http://www.itu.int/net4/wsis/forum/2015/Outcomes/

World Summit on the Information Society. (2005). *Report of the Tunis phase of the World Summit on the Information Society, Tunis, Kram Palexpo, 16-18 November 2005*. Retrieved from https://www.itu.int/net/wsis/docs2/tunis/off/9rev1.pdf

Yamashita, T., Bailer, A. J., & Noe, D. A. (2013). Identifying at-risk subpopulations of Canadians with limited health literacy. *Epidemiology Research International*, *2013,* 1-10. Retrieved from https://www.researchgate.net/publication/330213078_Investigation_of_Health_Literacy_Levels_of_Nursing_Students_and_Affecting_Factors

Appendix A: Search Strategy and Terms

Women Search Terms		ICT Search Terms		Empowerment Search Terms
***searched with OR**	"AND"	*searched with OR	AND"	*searched with OR
Wom?n		Technolog*		Empower*
Female*		Information technolog*		Disempower*
Girl*		"information communications technolog*"		Barrier*
Maternal		"ICTs"		Enable*
		"social media"		Self concept
		mobile		Self efficacy
		handheld		Capacit*
		telehealth		Emancipat*
		computer		
		Smartphone		
		Digital		
		Internet		
		Telecommunication*		
		"world wide web"		
		Laptop		
		ICT4D		
		"web-based"		
		Iphone		
		Ipad		

* at end of word = truncation, any number of letters (e.g. capacit* will find capacity or capacities)
? at end of beginning of word is used to represent one or more other characters in a search term (e.g. wom?n will find women or woman)

Figure A-1 *Search Strategy and Terms*

Appendix B: PRISMA Flow Diagram for Screening Process

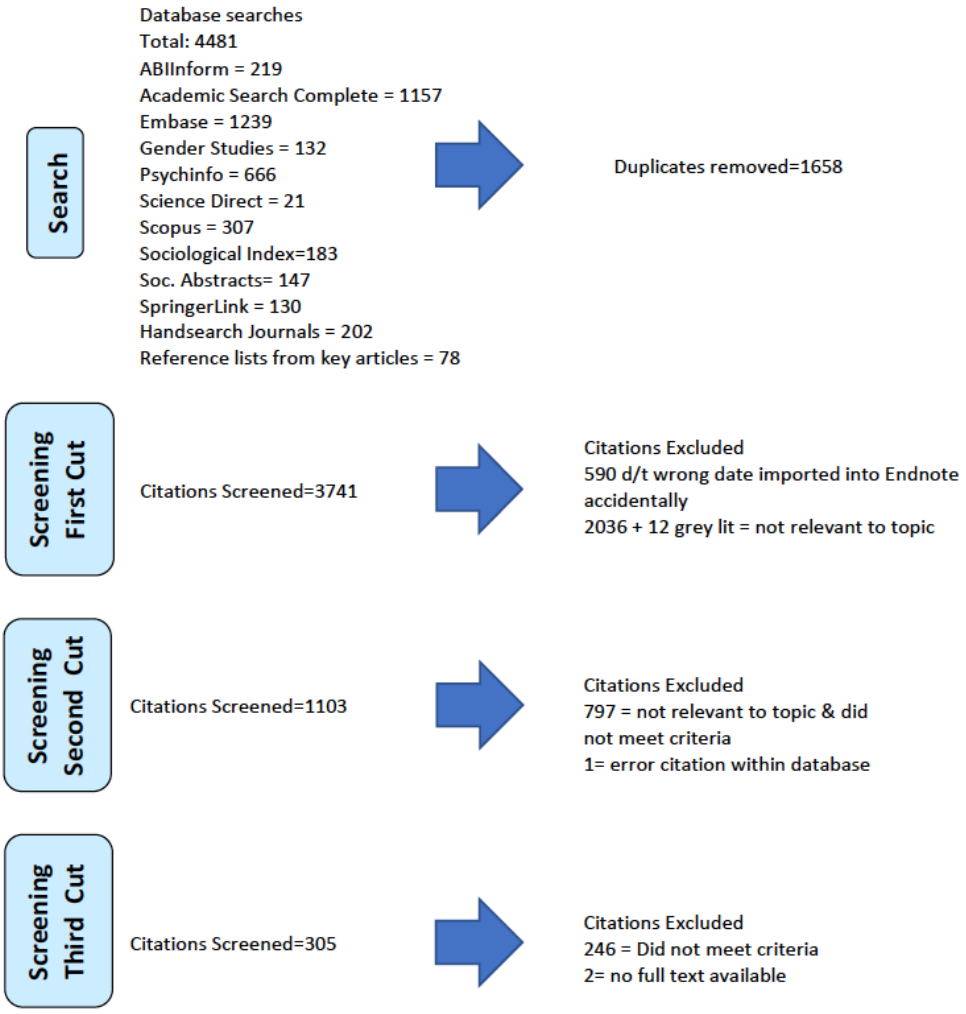


Figure A-2 *PRISMA Flow Diagram Process*

Appendix C: Template for Data Extraction

Reviewer:
Date:
APA Citation:

Data to be extracted	Notes
Refid #	
Title & Abstract	
Year of Publication	
Country of Study	
Time of study completion	
Study Objective	
Methodology	
Measures used	
On site (if so where); or virtual; or both	
Data Analysis	
Key Findings	
Authors Conclusions	
Implications for policy	
Implications for practice	
What type(s) of ICT are included in study?	
What is the ICT intervention for this study?	
Other relevant details of ICT	
Demographics of female participants (income, education, ethnicity, etc.)	
Women excluded? Why? Implications	
How is empowerment described or defined?	
Was empowerment a consideration in the design of the study?	
Was a measurement of empowerment stated or used?	
Was empowerment considered as a primary outcome of the study?	
Which social determinants of health are present in the study?	
How are the social determinants of health described?	
Theoretical Framework used? Note if empowerment related.	
Comments	

Table A-1 *Template for Data Extraction*

Appendix D: PRISMA Flow Diagram for Screening Process for Re-Run Searches

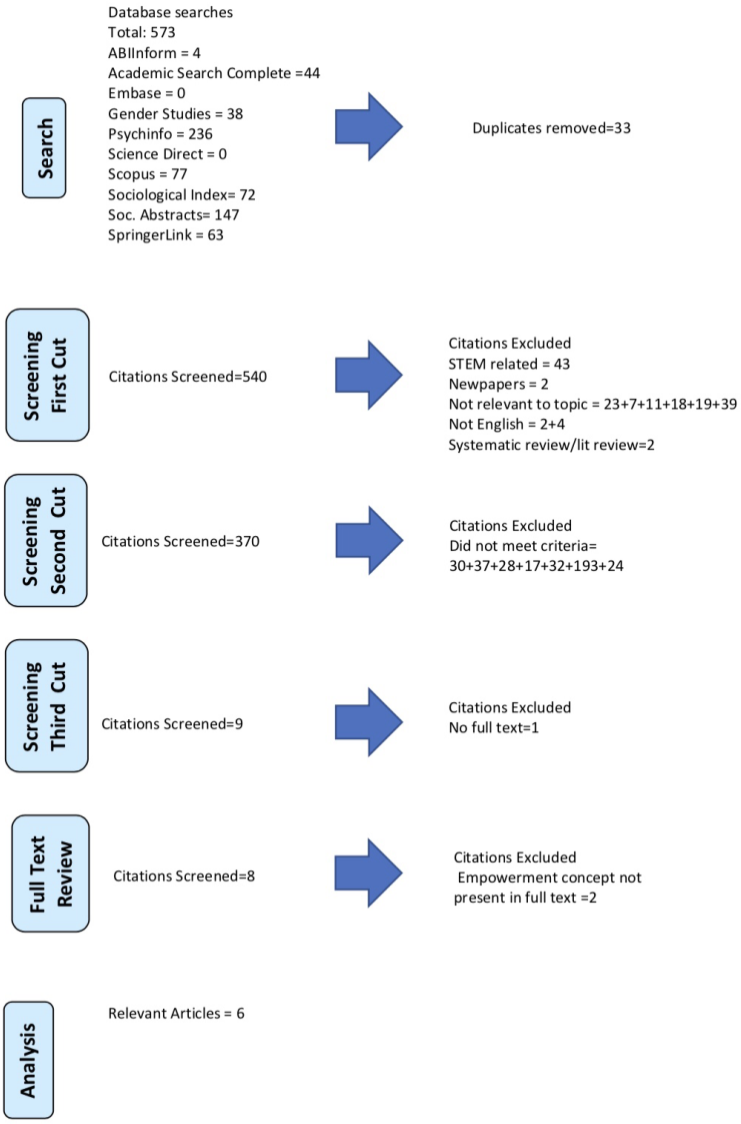


Figure A.3 *PRISMA Flow Diagram for Screening Process for Re-Run Searches*

Appendix E: Excerpts from Journal (photographs

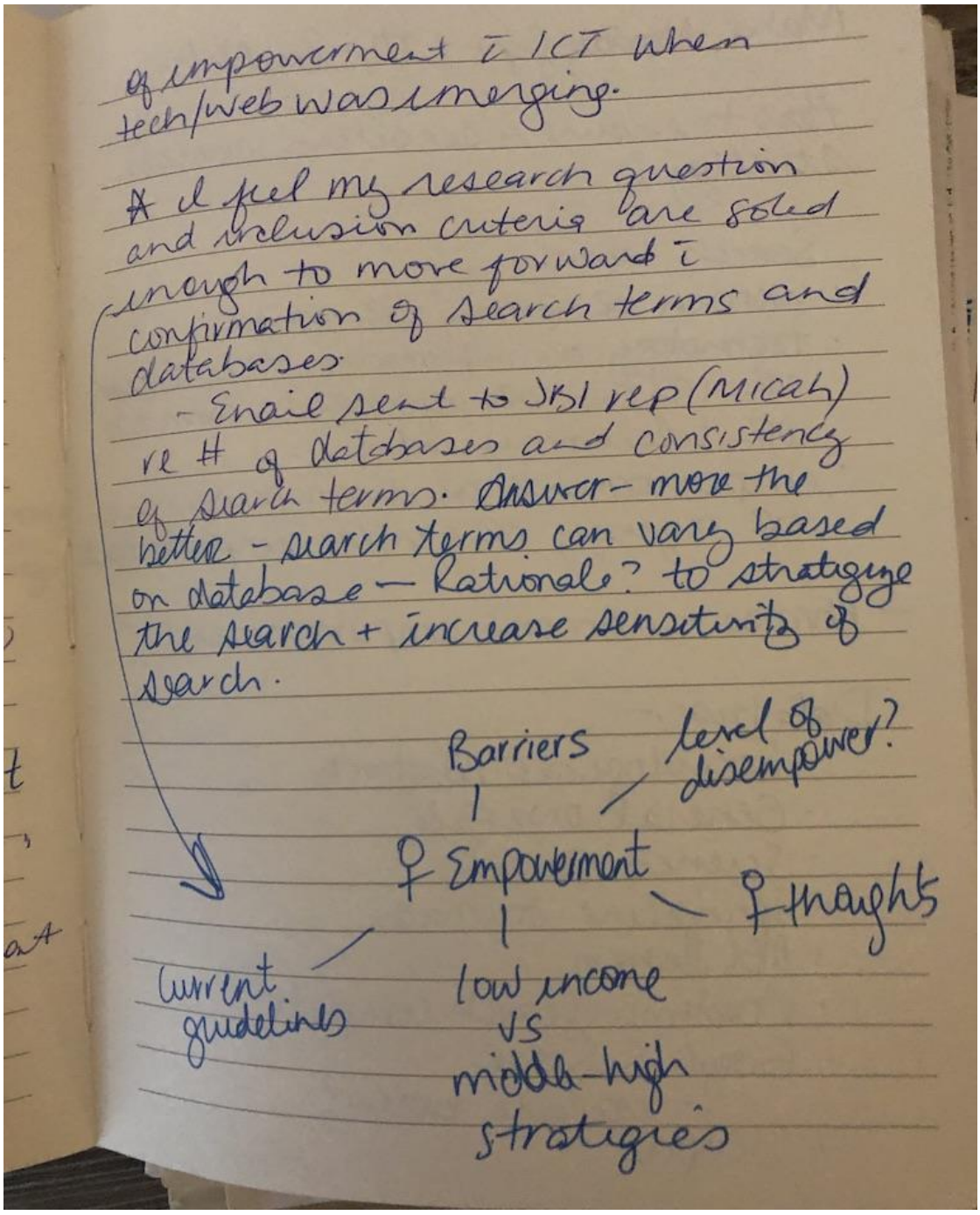
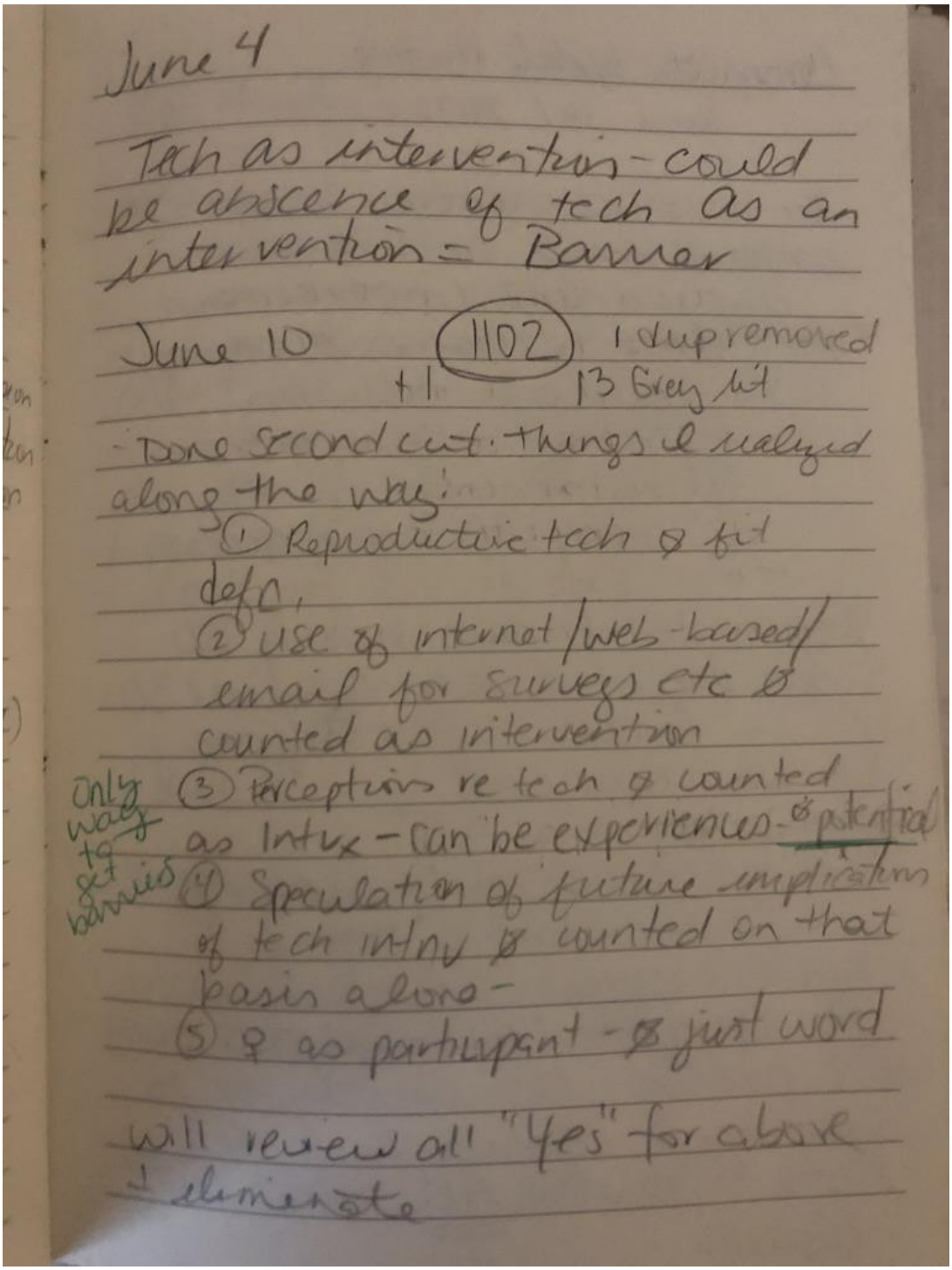


Figure A.4 Excerpt from Journal


June 4

Tech as intervention - could be absence of tech as an intervention = Barrier

June 10 (1102) 1 dup removed
+1 13 Grey lit

- Done second cut. things I realized along the way:
  - ① Reproductive tech ∅ fit defn.
  - ② use of internet/web-based/email for surveys etc ∅ counted as intervention
  - ③ Perceptions re tech ∅ counted as Intvx - can be experiences & potential
  - ④ Speculation of future implications of tech intvx ∅ counted on that basis alone -
  - ⑤ ♀ as participant - ∅ just word

Only way to get barriers

will review all "Yes" for above + eliminate

Figure A.4 *Excerpt from Journal*

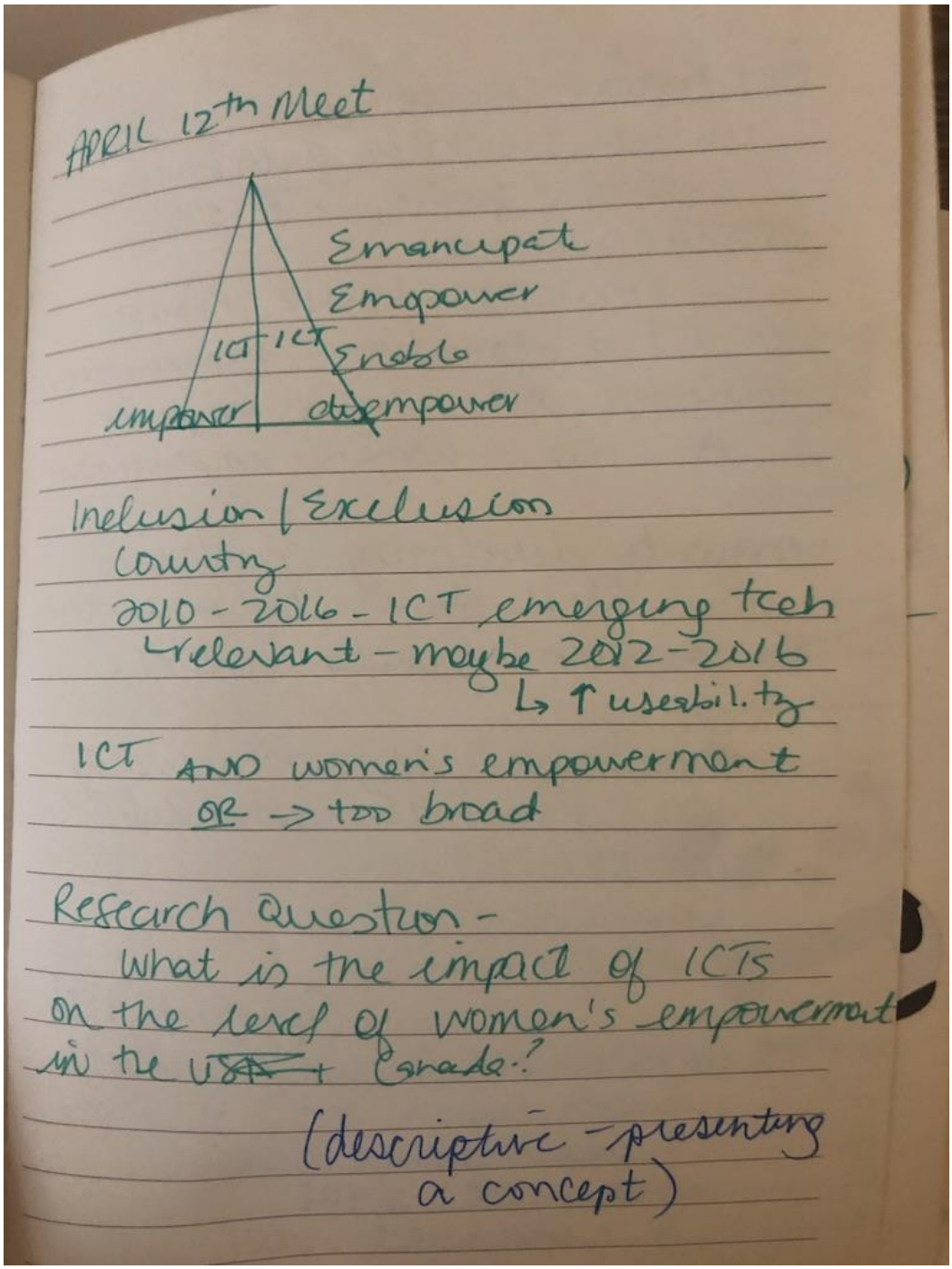


Figure A.4 *Excerpt from Journal*

Appendix F: Scoping Review Articles

Admiraal, J. M., van der Velden, A. W., Geerling, J. I., Burgerhof, J. G., Bouma, G., Walenkamp, A. M., ... & Reyners, A. K. (2017). Web-based tailored psychoeducation for breast cancer patients at the onset of the survivorship phase: A multicenter randomized controlled trial. *Journal of Pain and Symptom Management*, *54*(4), 466-475.

Åhman, A., Sarkadi, A., Lindgren, P., & Rubertsson, C. (2016). "It made you think twice"–an interview study of women's perception of a web-based decision aid concerning screening and diagnostic testing for fetal anomalies. *BMC Pregnancy and Childbirth*, *16*(1), 267.

Akinfaderin-Agarau, F., Chirtau, M., Ekponimo, S., & Power, S. (2012). Opportunities and limitations for using new media and mobile phones to expand access to sexual and reproductive health information and services for adolescent girls and young women in six Nigerian states. *African Journal of Reproductive Health*, *16*(2), 219-230.

Albright, C. L., Steffen, A. D., Novotny, R., Nigg, C. R., Wilkens, L. R., Saiki, K., & Brown, W. J. (2012). Baseline results from Hawaii's Nā Mikimiki project: A physical activity intervention tailored to multiethnic postpartum women. *Women & Health*, *52*(3), 265-291.

Atkinson, K. M., Westeinde, J., Ducharme, R., Wilson, S. E., Deeks, S. L., Crowcroft, N., & Wilson, K. (2016). Can mobile technologies improve on-time vaccination? A study piloting maternal use of ImmunizeCA, a Pan-Canadian immunization app. *Human Vaccines & Immunotherapeutics*, *12*(10), 2654-2661.

Atlas, S. J., Ashburner, J. M., Chang, Y., Lester, W. T., Barry, M. J., & Grant, R. W. (2012). Population-based breast cancer screening in a primary care network. *The American Journal of Managed Care*, *18*(12), 821.

Ayiasi, R. M., Kolsteren, P., Batwala, V., Criel, B., & Orach, C. G. (2016). Effect of village health team home visits and mobile phone consultations on maternal and newborn care practices in Masindi and Kiryandongo, Uganda: A community-intervention trial. *PloS One*, *11*(4), e0153051.

Ball, K., Mouchacca, J., & Jackson, M. (2014). The feasibility and appeal of mobile 'apps' for supporting healthy food purchasing and consumption among socioeconomically disadvantaged women: A pilot study. *Health Promotion Journal of Australia*, *25*(2), 79-82.

Bissonnette-Maheux, V., Provencher, V., Lapointe, A., Dugrenier, M., Dumas, A. A., Pluye, P., & Desroches, S. (2015). Exploring women's beliefs and perceptions about healthy eating blogs: A qualitative study. *Journal of Medical Internet Research*, *17*(4).

Brinkel, J., May, J., Krumkamp, R., Lamshöft, M., Kreuels, B., Owusu-Dabo, E., ... & Fobil, J. N. (2017). Mobile phone-based interactive voice response as a tool for improving access to healthcare in remote areas in Ghana: An evaluation of user experiences. *Tropical Medicine & International Health*, *22*(5), 622-630.

Brown, S., Hudson, D. B., Campbell-Grossman, C., & Yates, B. C. (2014). Health promotion text blasts for minority adolescent mothers. *MCN: The American Journal of Maternal/Child Nursing*, *39*(6), 357-362.

Chew, H. E., Ilavarasan, V. P., & Levy, M. R. (2015). Mattering matters: Agency, empowerment, and mobile phone use by female microentrepreneurs. *Information Technology for Development*, *21*(4), 523-542.

Chib, A., Malik, S., Aricat, R. G., & Kadir, S. Z. (2014). Migrant mothering and mobile phones: Negotiations of transnational identity. *Mobile Media & Communication*, *2*(1), 73-93.

Choi, J., hyeon Lee, J., Vittinghoff, E., & Fukuoka, Y. (2016). mHealth physical activity intervention: A randomized pilot study in physically inactive pregnant women. *Maternal and Child Health Journal*, *20*(5), 1091-1101.

Choo, E., Guthrie, K. M., Mello, M., Wetle, T. F., Ranney, M., Tapé, C., & Zlotnick, C. (2016). "I need to hear from women who have 'been there'": Developing a woman-focused intervention for drug use and partner violence in the emergency department. *Partner Abuse*, *7*(2), 193.

Ehlers, D. K., Huberty, J. L., & de Vreede, G. J. (2015). Can an evidence-based book club intervention delivered via a tablet computer improve physical activity in middle-aged women? *Telemedicine and e-Health*, *21*(2), 125-131.

Fiander, A., Ndahani, C., Mmuya, K., & Vanneste, T. (2013). Results from 2011 for the transportMYpatient program for overcoming transport costs among women seeking treatment for obstetric fistula in Tanzania. *International Journal of Gynecology & Obstetrics*, *120*(3), 292-295.

Fjeldsoe, B. S., Miller, Y. D., & Marshall, A. L. (2013). Social cognitive mediators of the effect of the MobileMums intervention on physical activity. *Health Psychology*, *32*(7), 729.

Frizzo-Barker, J., & Chow-White, P. A. (2012). "There's an App for That" Mediating mobile moms and connected careerists through smartphones and networked individualism. *Feminist Media Studies*, *12*(4), 580-589.

Gilbert, L., Shaw, S. A., Goddard-Eckrich, D., Chang, M., Rowe, J., McCrimmon, T., & Epperson, M. (2015). Project WINGS (Women Initiating New Goals of Safety): A randomised controlled trial of a screening, brief intervention and referral to treatment (SBIRT) service to identify and address intimate partner violence victimisation among

substance-using women receiving community supervision. *Criminal Behaviour and Mental Health*, *25*(4), 314-329.

Gold, K. J., Normandin, M. M., & Boggs, M. E. (2016). Are participants in face-to-face and internet support groups the same? Comparison of demographics and depression levels among women bereaved by stillbirth. *Archives of Women's Mental Health*, *19*(6), 1073-1078.

Handapangoda, W. S., & Sisira Kumara, A. (2012). From silence to voice: Examining the empowerment potential of mobile phones to women in Sri Lanka: The case of dependent housewives. Retrieved from https://mpra.ub.uni-muenchen.de/41768/

Hearn, L., Miller, M., & Lester, L. (2014). Reaching perinatal women online: The healthy you, healthy baby website and app. *Journal of Obesity, 2014*, 1-9

Holbrey, S., & Coulson, N. S. (2013). A qualitative investigation of the impact of peer to peer online support for women living with polycystic ovary syndrome. *BMC Women's Health*, *13*(1), 51.

Islam, M. K., & Slack, F. (2016, March). Women in rural Bangladesh: Empowered by access to mobile phones. In *Proceedings of the 9th International Conference on Theory and Practice of Electronic Governance* (pp. 75-84).

Jonas, S. M., Deserno, T. M., Buhimschi, C. S., Makin, J., Choma, M. A., & Buhimschi, I. A. (2015). Smartphone-based diagnostic for preeclampsia: A mHealth solution for administering the Congo Red Dot (CRD) test in settings with limited resources. *Journal of the American Medical Informatics Association*, *23*(1), 166-173.

Kim, C., Draska, M., Hess, M. L., Wilson, E. J., & Richardson, C. R. (2012). A web-based pedometer programme in women with a recent history of gestational diabetes. *Diabetic*

Medicine, *29*(2), 278-283.

Kim, D. R., Hantsoo, L., Thase, M. E., Sammel, M., & Epperson, C. N. (2014). Computer-assisted cognitive behavioral therapy for pregnant women with major depressive disorder. *Journal of Women's Health*, *23*(10), 842-848.

Kim, H. K., Niederdeppe, J., Graham, M., Olson, C., & Gay, G. (2015). Effects of online self-regulation activities on physical activity among pregnant and early postpartum women. *Journal of Health Communication*, *20*(10), 1115-1124.

Kukafka, R., Yi, H., Xiao, T., Thomas, P., Aguirre, A., Smalletz, C., ... & Crew, K. (2015). Why breast cancer risk by the numbers is not enough: Evaluation of a decision aid in multi-ethnic, low-numerate women. *Journal of Medical Internet Research*, *17*(7).

Lindsay, M., Messing, J. T., Thaller, J., Baldwin, A., Clough, A., Bloom, T., ... & Glass, N. (2013). Survivor feedback on a safety decision aid smartphone application for college-age women in abusive relationships. *Journal of Technology in Human Services*, *31*(4), 368-388.

Martinez-Brockman, J. L., Shebl, F. M., Harari, N., & Perez-Escamilla, R. (2017). An assessment of the social cognitive predictors of exclusive breastfeeding behavior using the Health Action Process Approach. *Social Science & Medicine*, *182*, 106-116.

Mehta, B. S., & Mehta, N. (2014). ICT and Socio-economic empowerment of rural women: Case of mobile phone in India. *Knowledge Horizons-Economics*, *6*(4), 103-112.

Min, Y. H., Lee, J. W., Shin, Y. W., Jo, M. W., Sohn, G., Lee, J. H., ... & Yu, J. H. (2014). Daily collection of self-reporting sleep disturbance data via a smartphone app in breast cancer patients receiving chemotherapy: A feasibility study. *Journal of Medical Internet Research*, *16*(5), e135.

Nord, J. H., Riggio, M. T., & Paliszkiewicz, J. (2017). Social and economic development through information and communications technologies: Italy. *Journal of Computer Information Systems*, *57*(3), 278-285.

Parajuli, R., & Doneys, P. (2017). Exploring the role of telemedicine in improving access to healthcare services by women and girls in rural Nepal. *Telematics and Informatics*, *34*(7), 1166-1176.

Potnis, D. (2016). Culture's consequences: Economic barriers to owning mobile phones experienced by women in India. *Telematics and Informatics*, *33*(2), 356-369.

Sarkar, S. (2016). Beyond the "digital divide": The "computer girls" of Seelampur. *Feminist Media Studies*, *16*(6), 968-983.

Siekkinen, M., Kesänen, J., Vahlberg, T., Pyrhönen, S., & Leino-Kilpi, H. (2015). Randomized, controlled trial of the effect of e-feedback on knowledge about radiotherapy of breast cancer patients in Finland. *Nursing & Health Sciences*, *17*(1), 97-104.

Sjöström, M., Umefjord, G., Stenlund, H., Carlbring, P., Andersson, G., & Samuelsson, E. (2013). Internet-based treatment of stress urinary incontinence: A randomised controlled study with focus on pelvic floor muscle training. *BJU International*, *112*(3), 362-372.

Song, F. W., West, J. E., Lundy, L., & Smith Dahmen, N. (2012). Women, pregnancy and health information online: The making of informed patients and ideal mothers. *Gender & Society*, *26*(5), 773-798.

Sriramatr, S., Berry, T. R., & Spence, J. C. (2014). An Internet-based intervention for promoting and maintaining physical activity: A randomized controlled trial. *American Journal of Health Behavior*, *38*(3), 430-439.

Steffen, A. M., & Gant, J. R. (2016). A telehealth behavioral coaching intervention for

neurocognitive disorder family carers. *International Journal of Geriatric Psychiatry, 31*(2), 195-203.

Takeuchi, S., & Horiuchi, S. (2016). Randomised controlled trial using smartphone website vs leaflet to support antenatal perineal massage practice for pregnant women. *Women and Birth, 29*(5), 430-435.

Tyers, A. (2012). A Gender Digital Divide? Women learning english through ICTs in Bangladesh. In *mLearn*, 94-100.

Ventura, F., Sawatzky, R., Öhlén, J., Karlsson, P., & Koinberg, I. (2017). Challenges of evaluating a computer-based educational programme for women diagnosed with early-stage breast cancer: A randomised controlled trial. *European Journal of Cancer Care, 26*(5).

Vivakaran, M. V., & Maraimalai, N. (2017). Feminist pedagogy and social media: A study on their integration and effectiveness in training budding women entrepreneurs. *Gender and Education, 29*(7), 869-889.

Vogel, R. I., Petzel, S. V., Cragg, J., McClellan, M., Chan, D., Dickson, E., & Geller, M. A. (2013). Development and pilot of an advance care planning website for women with ovarian cancer: A randomized controlled trial. *Gynecologic Oncology, 131*(2), 430-436.

Weinert, C., Cudney, S., Comstock, B., & Bansal, A. (2014). Computer intervention: Illness self-management/quality of life of rural women. *Canadian Journal of Nursing Research, 46*(1), 26-43.

Wen, K. Y., Miller, S. M., Kilby, L., Fleisher, L., Belton, T. D., Roy, G., & Hernandez, E. (2014). Preventing postpartum smoking relapse among inner city women: Development of a theory-based and evidence-guided text messaging intervention. *JMIR Research*

Protocols, *3*(2).

Wollersheim, D., Koh, L., Walker, R., & Liamputtong, P. (2013). Constant connections: Piloting a mobile phone-based peer support program for Nuer (southern Sudanese) women. *Australian Journal of Primary Health*, *19*(1), 7-13.